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ABSTRACT

This education kit was compiled by Iowa's Nongame Program to celebrate the successful reintroduction of the peregrine falcon (Cedar Rapids, July 1989) after its near extinction in the state in the 1960s. This resource unit was developed to enhance the education of students and teachers in Iowa about endangered species and specifically the peregrine falcon. An introduction provides a historical perspective of the human/falcon relationship as well as information on falconry, including falconry in Iowa. Nine lesson plans address the following topics: (1) survival characteristics of peregrine falcons (grades 3-4); (2) characteristics of raptors--birds of prey (grades 5-6); (3) special adaptations of birds--feet and beaks (grades 3-8); (4) peregrine migration patterns (grades 7-8); (5) the human connection--the effects of pesticides (grades 3-6); (6) survival factors (grades 3-6); (7) the human connection--the effect of tropical forest destruction (grades 7-8); (8) efforts to recover endangered species, especially the peregrine falcon in Iowa (grades 5-6); and (9) a review (grades 3-8). Lesson plans include objective(s), method(s), background information, and, selectively: materials, vocabulary, procedures, extension activities, instructions for games, illustrations, and answers to questions. Additional materials include a glossary, Iowa peregrine fact sheet and illustration comparing the peregrine falcon and American kestrel (sparrow hawk), newsletter articles about the peregrine recovery program in Iowa including the reintroduction logo, and black and white illustrations to be used with the lesson material. A certificate of achievement completes the kit. (AA)

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Recovering Our Heritage
Peregrine Falcons

Cathy Meddin photo

The peregrine falcon was reintroduced into Iowa by the Nongame Program in 1989.

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RECOVERING OUR HERITAGE -- PEREGRINE FALCONS

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RECOVERING OUR HERITAGE – PEREGRINE FALCONS

The unprecedented rate of habitat loss and practices such as chemical contamination, unwise development, and deforestation has driven innumerable wild animals and plants to (or near) extinction. The acceleration of species extinctions could mean the loss of one million species by the year 2000. Even though the process is natural, man-made situations have accelerated the process and made this loss an urgent environmental concern.

Congress enacted the Endangered Species Act in 1973, that established the legal foundation necessary to save species in the United States.

The Peregrine Falcon, a bird of prey with a heavy black mustache, was eliminated as a nesting species by the late 1960s. These beautiful predators were unable to reproduce because of widespread pesticide use in the 1950s and 1960s. Peregrine falcons were reintroduced to Cedar Rapids, Iowa, In July, 1989, with four birds placed in "hack boxes" on the Telecom*USA building, a ten-story building that resembles the cliffs where falcons can perch, nest, and glide gracefully around on the updrafts of air. Six more falcons were released from the site.

This urban release, with more "plantings" planned creates a unique opportunity for children and adults to learn more about endangered species.

This Peregrine Teacher Resource Packet will enhance the education of teachers and students and help them to understand and appreciate the Peregrine Falcon on its road to recovery in Iowa.

ACKNOWLEDGEMENTS

The main idea for this education kit came from the Peregrine Teacher Resource Packet, Peregrine Falcon: The Path to Recovery, which was published by the Colorado Peregrine Partnership in 1988. Publishing a similar resource package for Iowans, took the gracious cooperation of the original authors, artists, designers and agencies, plus the creative inspiration of numerous people in Iowa who worked so hard to pull together the package in a very short amount of time. After releasing falcons into Iowa, the Iowa Department of Natural Resources' Nongame Program was keenly interested in producing a peregrine education kit to celebrate a successful release and Earth Day 1990. Outdoor writer and photographer Cathy Meddin organized a team of top environmental educators to adapt and create a peregrine package for the Nongame Program. Rosalie Cochran chaired the committee and led them on their mission. The Iowa Wildlife Federation joined forces with the committee and reprinted the Nongame "Falcon Fever" poster for inclusion in the package which will originally be distributed as an addendum to the National Wildlife Federation's Earth Day kit. This package represents the cooperative spirit of a new era of natural resource management--for ultimately the cooperation of individuals, organizations, states and countries will determine the fate of wildlife in the future.

CREDITS

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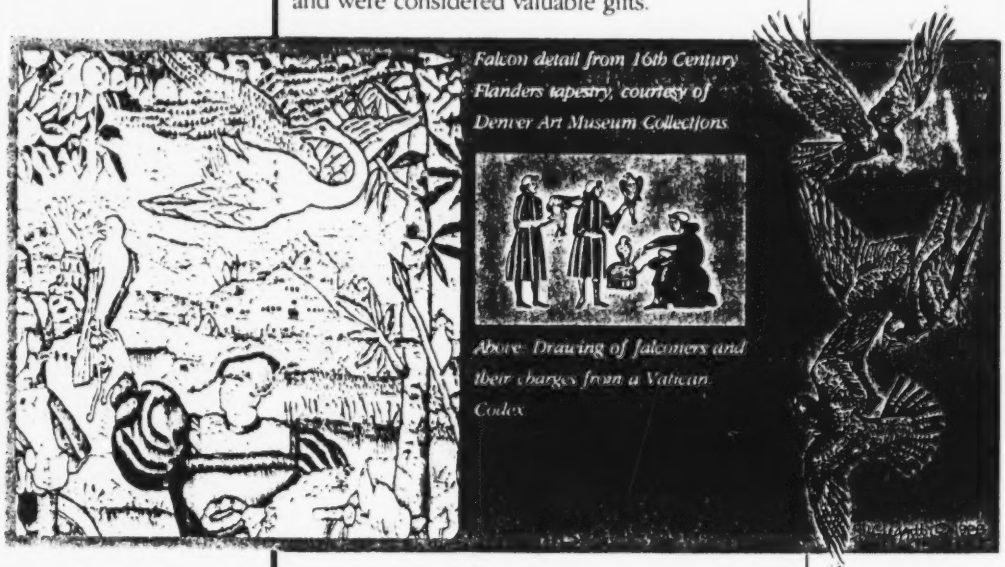
Fascinating Falcons

Falcons, worshipped as the "Lofty Ones," appeared in the writings, paintings, and sculptures of the early Egyptians and Persians some 3,000 years ago. References to the grace and power of falcons appear during the times of Aristotle and Marco Polo. During the Middle Ages, owning falcons, particularly Peregrine Falcons, became a symbol of power. Peregrines were sought after by kings and other nobility and were considered valuable gifts.



Falcon detail from 16th Century Flanders tapestry, courtesy of Denver Art Museum Collections

Above: Drawing of falconers and their charges from a Vatican Codex

Swift birds of prey, falcons are found throughout the world, except for a few oceanic islands and Antarctica. The 58 species in the Falcon Family range in height from the 6½-inch Pygmy Falcon of South America to the 24 to 25-inch Gyrfalcon of the Arctic tundra. The smallest North American falcon is the 9 to 12-inch American Kestrel, and the rarest North American falcon is the crow-sized Peregrine Falcon. Members of this family have a conspicuous notched bill which is used to break the vertebrae of their prey. Falcons have excellent eyesight. Experiments in Germany confirmed that Peregrine Falcons can recognize sitting doves from a distance of 3,000 feet.

With high-speed adaptations such as bullet-like heads, short necks, broad shoulders, and long, pointed wings, falcons are among the fastest birds in the world. Peregrines are considered the fastest falcons; they are able to cruise along in level flight at 50 to 60 miles an hour and have been clocked at more than 200 miles an hour in their dives after prey.

The Peregrine Falcon's speed and grace make it one of the most interesting falcons to watch or study. Its hunting style, for instance, is spectacular. When this regal-looking falcon spots its prey (smaller birds such as swifts, flickers, robins, jays, crows, and pigeons), it seemingly pauses in midair, turns downward with a few rapid wing beats, and dives almost too quickly for the eye to follow. Moving at incredible speed, the Peregrine usually strikes its prey with clenched talon, knocking the other bird senseless. The Peregrine follows the falling prey bird downward, plucking smaller birds out of the air and picking larger birds up from the ground. Peregrines are successful in killing their prey only 10 to 40 percent of the time. Consequently, they hunt over a wide area—up to 18 miles from their nest.

Partly because they are so fascinating, Peregrine Falcons have become one the best known symbols in humankind's efforts to save endangered species. Since the passage of the Endangered Species Act in 1973, Peregrines have been the subject of intense activity to keep them from sliding over the brink of extinction. An important step in recovery efforts was successful propagation of falcons in captivity and reintroduction back to the wild. These efforts have been somewhat successful, but the Peregrine still faces serious threats to its survival. These threats include the continued use of dangerous pesticides such as DDT and the loss of wintering bird habitat through the destruction of huge tracts of tropical rain forests in Central America.

Falconry

Falconry is the art of hunting wild game with nature's proven predators - the raptors or birds of prey. The sport has changed little since the days of the ancient Egyptians. Falconry was often mentioned in the writings of Shakespeare and gained much popularity in England where it was strictly governed as a sport for the nobility. In the United States, falconry has gained popularity within the past 25 years.

Hunting with falcons or hawks is a way to return to basics, develop association with a natural predator and, after much dedication, possibly bag game.

Falconer's Training

In the mid-1970s a set of federal guidelines for falconry was developed. These have since been adopted with slight modifications by those states where falconry is permitted, including Iowa.

A would-be falconer must first find a willing sponsor. A sponsor is a licensed falconer of general or master class, willing to serve as a tutor to the applicant during a two-year apprenticeship. A written test on raptors must also be taken before a permit is granted. Additionally, the equipment and facilities of the aspiring falconer must be inspected and approved.

Once a sponsor is found, the test is passed, and facilities are approved, the apprentice is permitted to possess one raptor. In Iowa, apprentice-class falconers may fly only a red-tailed hawk, one of the more common and easily cared-for raptors.

Further falconry privileges are obtained by additional years of experience in the sport. After two years of apprenticeship, including filing records and reports of field training prepared by the apprentice and sponsor, a person may apply for a general permit. The general falconer can possess up to two raptors of any species not listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS). After five years as a general falconer, a master permit may be obtained, allowing up to three birds, including one threatened species (with USFWS approval).

The Job of a Falconer

The practice of training a bird is based on the theory of repetition and response to food. Raptors cannot be trained to respond well to many verbal commands, and do not develop as strong a friendship or psychological bonding to their master as a hunting dog would. So, how does a falconer ensure the return of his bird once released to hunt? The primary key is knowing the bird's proper "flying weight." With experience, a falconer is able to predict a bird's behavior at different weights.

Generally, he or she tries to keep the bird low enough in weight, and thus hungry enough, to respond to food when presented from the trainer's fist or a leather lure. The bird at flying weight has little excess fat, is more agile and more apt to pursue wild prey. This does not mean one can neglect feeding a raptor. Instead, the bird is weighed each day and fed only the amount of food needed to maintain proper weight. The maintenance of appropriate weight coupled with familiarizing the bird to the falconer and extensive field training are necessary for successful falconry.

The primary job of the falconer in the field is to create a favorable hunting situation for the bird, first by selecting a site where game is plentiful and second by helping to locate and flush prey. In cases where it is allowed, using planted game birds to train and reinforce training in often helpful.

Raptors Used in Falconry

Species of raptors are adapted for different hunting styles and quarry. Three types flown in the U.S. are buteos, accipiters and falcons.

Falcons have long pointed wings and pursue prey in flight. They are trained to circle above a falconer waiting for game to flush and attack in a high-speed dive. The falcons most often used in hunting include gyrfalcons, prairie falcons, peregrine falcons and American kestrels. Only the kestrel is common in Iowa. Primary prey includes waterfowl, pheasants, quail, and small mammals.

Accipiters have short wings and long tails adapted for hunting in woodlands. They are extremely quick

flying from the falconer's fist, can be hunted in open cover as well as timbered, and pursue a broad prey base. The accipiters include the goshawk, sharp-shinned hawk and Copper's hawk, which is an endangered species in Iowa.

Many falconers prefer to use buteos for hunting. They are more easily trained and do not require as large an area for hunting and pursuing prey. Buteos have short, broad wings and are adapted to hunt in mixed brushy and open field situations. The species most commonly used for falconry are the red-tailed hawk and the Harris Hawk, the red-tailed being most prevalent in Iowa. These raptors are most commonly hunted from perches (tree limbs) above the falconer, and the most common quarry are small rodents, although rabbits, squirrels and upland birds are taken.

Falconry in Iowa

Currently, there are 27 licensed falconers in Iowa ranging from apprentice to master level. Applications and permits are handled through the law enforcement bureau of the Department of Natural Resources (DNR) in cooperation with the USFWS. A falconry license costs $10 and is valid for two years. In addition, it must be accompanied by a current state hunting license and habitat stamp.

Plentiful game is required for successful game hawking. Likewise, much dedication to training and care of the bird is essential. Hawks and falcons are much more difficult to care for than a hunting dog, because they require a special diet, outside weathering and flight facilities, and specialized equipment that has to be made by the falconer. Although the time requirements, equipment expense and necessary commitment to the sport are substantial, the rewards are great. Few accomplishments bring such satisfaction as seeing a trained raptor swoop or dive successfully after wild game.

Our thanks to the Department of Natural Resources for permission to use exerpts from an article entitled "Falconry" by Karen Peterson Craft which appeared in the November, 1988 issue of Iowa Conservationist.

Fascinating Falcons: SUITED FOR SURVIVAL

GRADE LEVEL
3 and 4

MATERIALS
- Copies of "Peregrine Parts" handout

- scissors
- glue
- crayons
- construction paper
- pictures of Peregrine Falcons.

KEY VOCABULARY
adaptation
prey
bird of prey

OBJECTIVES
Students will be able to: 1) describe several characteristics of a Peregrine Falcon; and 2) describe how each characteristic helps the Peregrine survive.

METHOD
Students make a paper Peregrine Falcon by cutting and pasting body parts together.

BACKGROUND
All birds share certain general characteristics. For example, they all have wings, beaks, and feathers; they are warm blooded (able to regulate their own body temperature) and lay eggs. They also have specific characteristics that help them survive in their environment. These specific characteristics—such as narrow, pointed wings or strong claws—are called adaptations.

Like all birds of prey (raptors), Peregrines have adaptations that make them efficient hunters of other animals. The following adaptations help the Peregrine survive:

- The combination of sleek, streamlined bodies and long, pointed wings allows them to fly fast and maneuver quickly.
- Forward-facing eyes and keen eyesight (up to eight times more powerful than a human's) help the Peregrine spot prey from far away.
- Long, sharp talons and a sharp, hooked beak allow them to grasp and tear meat.
- Strong flight muscles help the Peregrine fly great distances to search for food and to migrate.
- Strong leg muscles help the Peregrine transport food over long distances.
- The black feathers on the crown of a Peregrine's head dip down below the eyes and cover the cheeks to form a dark helmet. This feature helps reduce glare from the sun.
- The Peregrine's long, narrow tail helps the bird maneuver quickly at high speeds.

These adaptations help Peregrine Falcons fly fast and maneuver quickly in the air when they hunt for food. Peregrines prey almost exclusively on smaller birds such as shore birds, pigeons, doves, robins, jays, swifts, and swallows.

PROCEDURE
1. Tell the students that by assembling a Peregrine Falcon they are going to learn about the physical characteristics and adaptations that help Peregrine Falcons survive. Present and discuss physical adaptations, defining the term and giving examples.
2. Have the students cut out all the "Peregrine Parts." Have them glue the body and tail parts to a piece of construction paper. Ask them why a sleek, streamlined body and tail would be important adaptations.
3. Have the students glue on the wings and ask why long, pointed wings would be an important adaptation. Continue with the head, emphasizing the shape of the beak, asking why this would be an important adaptation. Discuss the talons.

4. Once the Peregrine is assembled, discuss other features that make Peregrines good hunters such as eyesight, flight and leg muscles, and coloration.
5. Have students color their paper Peregrines by looking at the pictures of Peregrines they have collected or by using bird identification keys found in the school library.
6. When the students have completed their Peregrines, ask them to show their Peregrines to the rest of the class, describing at least one adaptation.

EXTENSION
1. Make a papier mache or cut and torn paper mask of a Peregrine Falcon's head showing the black feathers of the Peregrine's helmet.
2. List and compare the characteristics and adaptations of a Peregrine Falcon to the characteristics and adaptations of a common songbird such as a robin.

Fascinating Falcons: RIGHT ON WITH RAPTORS

GRADE LEVEL*
5 and 6

MATERIALS
- papier mache
- construction paper
- pipe cleaners
- tissue paper
- scissors
- glue
- other art materials

KEY VOCABULARY
nocturnal
diurnal
raptor
carrion
predator

OBJECTIVES
Students will be able to: 1) identify several physical characteristics of a raptor; 2) identify several species of raptors; and 3) describe several ways raptors are physically adapted to their environment.

METHOD
Through research and discussion students identify raptor characteristics and create their own raptors.

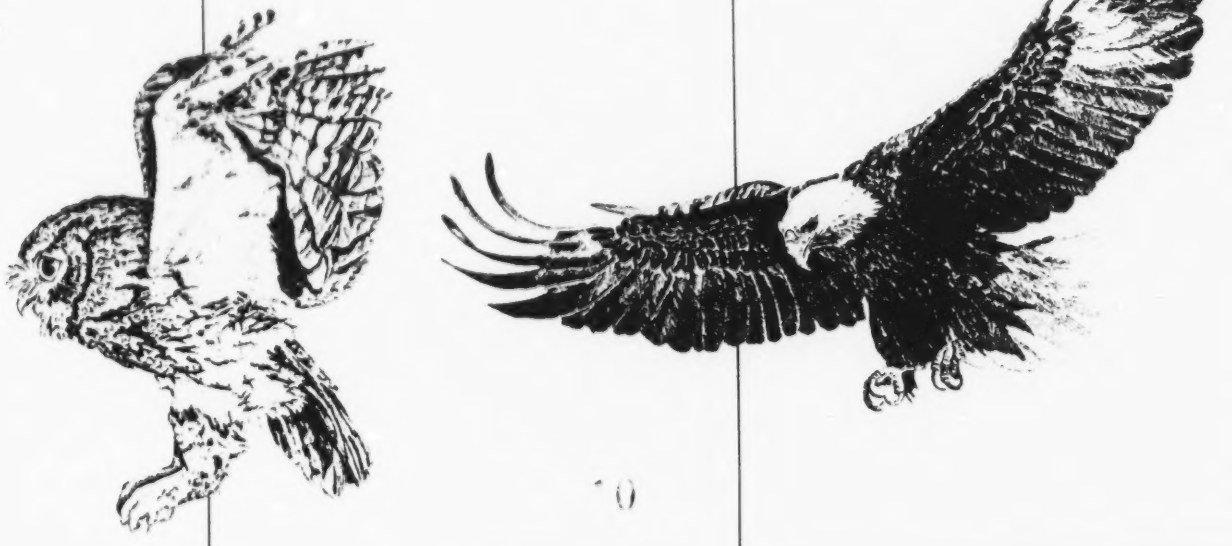
BACKGROUND
A raptor, also called a bird of prey, usually has the following characteristics: 1) eats meat; 2) has a strong, hooked bill for tearing flesh; 3) has powerful feet with long talons (claws) that grasp prey; and 4) has forward-facing eyes.

There are many kinds of raptors—owls, hawks, eagles, falcons, and vultures. Each has characteristics that distinguish it from other raptors.

Owls are silent, mostly nocturnal (nighttime) hunters. They have large eyes that gather light and help them hunt in darkness. They also have cup-like facial disks around their eyes which help focus sound and improve hearing.

Hawks are high-soaring birds with broad, rounded wings. They are diurnal (daytime) hunters of live prey.

Eagles are a kind of large hawk with wingspans of up to 6 to 8 feet.



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Vultures are scavengers (carrion eaters) that have small, un-feathered heads. Since they feed only on carrion, their feet are weak and their claws are not as sharp as the claws of eagles, hawks, and falcons.

These characteristics are adaptations that help raptors survive in their environment.

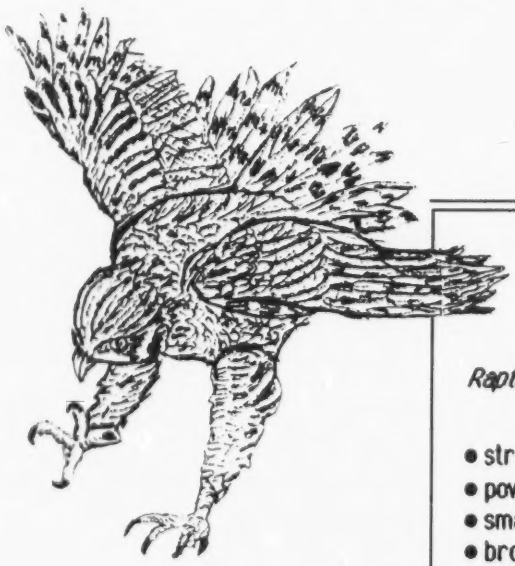
PROCEDURE

1. Discuss the characteristics of the various raptors in the background information. Be sure to point out the differences between species of raptors.
2. Copy the list, "Raptor Adaptations," on the blackboard or duplicate the list as a handout.

3. Have the students design and create an imaginary raptor, individually or in small groups. Then have each person or group name their bird and describe: a) what their bird eats and how it catches its prey; b)where their bird lives; c) how their bird is adapted to its environment.

EXTENSION

1. Using "Raptor Adaptations" create a matching activity for the students.
2. Make a chart comparing the characteristics of raptors to other common bird species.
3. Write a story from the perspective of a raptor. The students can describe what they see and feel as a raptor perched in a large tree, on top of a tall building, or soaring.



Falcons have narrow, pointed wings that help them fly fast and maneuver skillfully. They have black eyes, hooked talons, and conspicuously notched bills.

Raptor Adaptation

Raptor Characteristics	*Survival Advantage*
• strong, hooked bill	tearing
• powerful talons	grasping prey
• small, unfeathered head	keeping clean while eating
• broad, rounded wings	soaring searching for food
• long, narrow, pointed wings	skillful maneuvering and speed
• strong flight muscles	long distance flying
• toothed notched bill	breaking vertebrae of prey
• soft, fluffy feathers	muffling of sound
• forward facing large eyes	good vision at night
• facial disk	keen hearing

FOOTING THE BILL

(adapted from Nature-Scope: Birds, Birds, Birds: Fill the Bill and Feet are Neat)

GRADE LEVEL: 3 - 8

MATERIALS:
For the Beak and Feet game: copies of the beak and feet cards

For the Beak and Tool game: copies of the beaks and household items that closely match the beak's purpose.

Examples:
- eyedropper or straw (for a hummingbird's beak)
- chopsticks (to represent snipes, kiwis, and godwits)
- nutcracker or pliers (cardinals, sparrows, grosbeaks)
- large scoop or slotted spoon (pelicans and spoonbills)
- colander or other strainer (flamingos and some ducks); tongs (toucans)
- chisel and hammer (woodpeckers)
- pop bottle/can opener; the type with a hook (falcons, hawks, owls, etc.)

OBJECTIVE:
To learn more about the specialized beak and feet adaptations that birds have developed.

METHOD:
Students play an active run and match game that encourages them to learn more about beaks and feet.

BACKGROUND:
The beaks and feet of birds vary according to what they eat and where they live. It would be impossible for a great blue heron to use his spear like beak to suck nectar from a flower like a hummingbird. And the talons of a hawk would be ineffectual replacing the webbed feet of a duck. Different beak adaptations are useful for gathering different types of food and different foot adaptations help birds to maneuver in their habitats.

PROCEDURE:
1. Before beginning, decide which of the matching games you are going to play. The first, "Beaks & Feet", involves the children matching a beak with its appropriate foot (i.e. the children will try to match a falcon's talons with its hooked beak). For this game you will need to make copies of the cards, enough for two or three teams of 8 - 10 members each. The second game, "Beaks and Tools", involves matching a picture of a bird and its beak with the household item that is similar in structure and function (i.e. a picture of a cardinal, which uses its beak to crack seeds with hard outer coverings, would be matched with a nutcracker or pliers). For this second game you will need to make copies of the cards and gather the matching tools, enough for two or three teams of 8 members each.

2. Talk to the students about the different bird feet and/or beak adaptations. The following are some examples:

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BEAK ADAPTATIONS

• WOODPECKER's sharp and sturdy beak helps this bird to chisel into wood. The beak is accompanied by a pointed, barbed-tipped tongue that allows the woodpecker to feel into holes, then impale and withdraw insect larvae and eggs.

• FLAMINGOS and some ducks have comb-like strainers on the edges of the beak to filter out bits of food in the water.

• The beaks of CARDINALS, grosbeaks, sparrows and other finch-like birds are arched into the shape of a cone. Stout and sharp, they are used to crack seeds.

• SNIPES, godwits, curlews, and kiwis have long, thin beaks that they use to probe for and reach worms, insects, and other small animals buried in mud or sand.

• FALCONS, owls, hawks, eagles, and vultures have strong and sharply hooked beaks that they use to rip the flesh of their prey.

• HUMMINGBIRDS have long, hollow, beaks that they use to probe flowers for nectar. The beak protects the tongue which siurps up the nectar.

• TOUCANS have long, thick beaks which they use for reaching out and plucking fruit from trees.

• PELICANS and spoonbills have long, flattened or pouchlike beaks that they use to scoop up fish and other aquatic animals.

FEET ADAPTATIONS

• CLIMBERS - Woodpeckers have two toes in front and two toes in back for climbing up and down tree trunks.

• GRASPERS -Hawks, owls, and other birds of prey have large curved claws, called talons, that dig into their prey and help them hold onto it in flight.

• PERCHERS - Robins, mourning doves, and many other birds have three toes that face forward and one long hind toe that helps them grip their perches tightly.

• RUNNERS - Ostriches and killdeer have two and three toes, respectively (instead of four), and all their toes point forward for fast running.

• SCRATCHERS - Pheasants, chickens, and other chickenlike birds have rakelike toes for scratching in the soil.

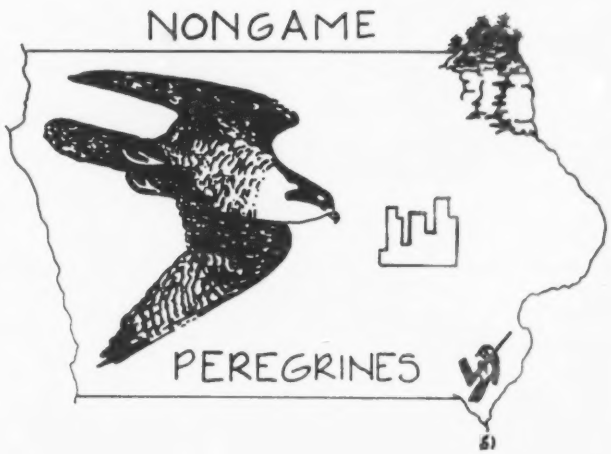
• SWIMMERS - Ducks, coots, and other swimmers use their feet as paddles.

3. Once you've discussed the adaptations, divide the students into two or three even numbered teams. Establish boundary lines. Put half of each team on one line and half of each on the other. Each team should be spaced far enough from an opposing team so as not to mix during the game.

4. One half of a team will get beak picture cards and the other half will get feet picture cards or a tool (depending on the game you chose to play).

5. On a signal, they run to the middle of the playing field and try to find the team member whose card or tool best matches theirs. If playing the "Beak and Feet" game, the students will want to match the foot with the head to which it belongs. If playing the "Beak and Tool" the students must match the beak with the 'similar' household tool.

6. Once students have found their match, they must get it confirmed by a leader or designated student. If the match is not approved, students return to the playing field and continue. If the match is confirmed, players sit in an assigned area until joined by remainder of team. The team that finishes first is the winner.



Cathy Meddin photo

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Fascinating Falcons: PURSUING THE PEREGRINE PATHS

GRADE LEVEL
7 AND 8

MATERIALS
- copies of "Peregrine Paths" (in pocket, inside back cover)
- research materials
- handout of activity questions
- ruler
- paper
- pencil
- detailed map of Western Hemisphere

KEY VOCABULARY
flyway
migration
home range

OBJECTIVES
Students will be able to: 1) describe the generalized migration patterns of several Peregrine Falcons and explain why Peregrines migrate; 2) describe what dangers Peregrines might encounter during migration; and 3) mathematically manipulate the data of four hypothetical Peregrine migration paths.

METHOD
Students research various aspects of migration and generalize migration paths of Peregrine Falcons. (Two 45-minute periods are recommended for this activity.)

BACKGROUND
Bird migration-the seasonal movement of birds from one place to another-has always fascinated humankind. Scientists are just beginning to unravel some of the mysteries as to how and why birds migrate. Various ideas have been proposed, including speculation that birds use the stars, the sun, the moon, and landmarks to navigate. Some birds might even use the Earth's magnetic field to help them find their way.

In an effort to track the general paths of migrating birds, scientists rely primarily on bird banding. When banded birds are found, scientists learn important information about where birds spend their winters and the paths (flyways) they use to reach their destinations.

Peregrine Falcons migrate in the autumn. Scientists speculate that they go south in order to find food- other birds that migrate. It's possible that the shorter days in the fall also stimulate the birds to migrate.

Peregrines -and other migratory birds - face a variety of dangers. Deforestation of tropical rain forests destroys habitat for many of the birds Peregrine Falcons eat. In addition, the pesticide DDT is still being used heavily, consequently entering the food chain, in many of the areas where Peregrines and their prey migrate. Migrating Peregrines face other hazards such as stormy weather, collisions with power lines and windows, and illegal hunting.

PROCEDURE
1. Have students work individually or in small groups to research the following topics: 1) why birds migrate; 2) why some Peregrine Falcons migrate while others don't; 3) home ranges of the three Peregrine Falcon subspecies. Discuss with the students the dangers migrating Peregrine Falcons might face, asking the students to suggest steps that could be taken to minimize these dangers.
2. When the students have completed their research, either lead a class discussion centered around the research topics, or have the students present their topics in a written format or an oral report, summarizing their research for the rest of the class.
3. Create a handout for each student or group of students to be distributed with the copied map of "Peregrine Paths." Note: The map depicts hypothetical migration paths of certain Peregrines.
4. The handout, to be used in conjunction with "Peregrine Paths," might include the following questions:
   A. Calculate the distance traveled by Peregrine A,B,C, and D. Make sure that your answer is given in both kilometers and miles.
   B. Which countries did Peregrines A and B migrate from and to?
   C. Name the large body of water Peregrine A crossed over during its migration.
   D. Over which states did Peregrine B fly?
   E. Assuming that Peregrines A, B, and C all took ten days to migrate, what was the average number of miles traveled per day by each Peregrine?
   F. Peregrine A flew what percentage of total miles that Peregrine D flew?
   G. What hazards might Peregrines A and D encounter while migrating that Peregrine B would not encounter?
   H. Name the countries that Peregrine D encountered.

cross over during migration.

I. If Peregrine C flew at an average speed of 45 kilometers per hour, how long did it take to complete its migration, assuming Peregrine C made no stops along the way?

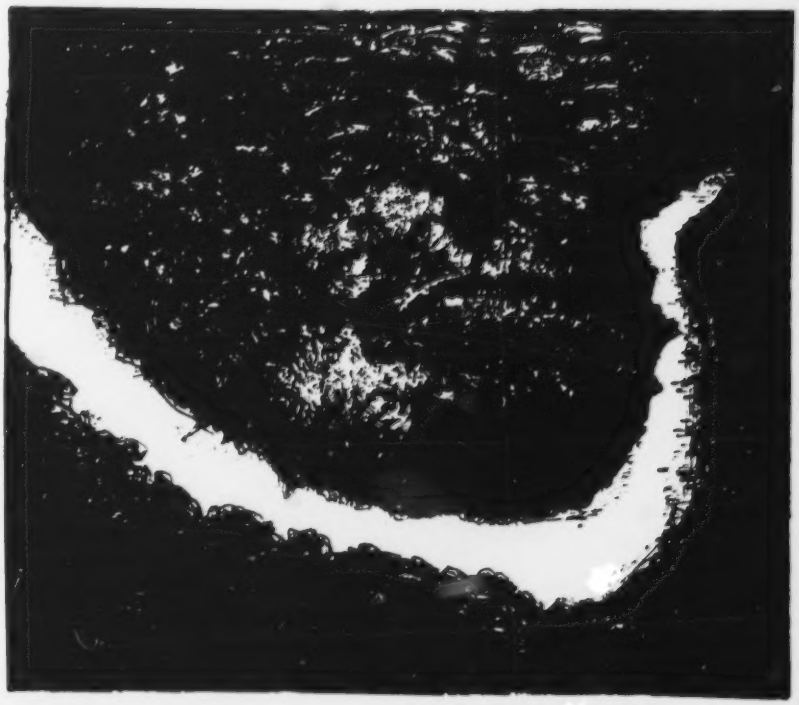
5. Have the students answer the questions individually or in small groups. Compare and discuss the answers with the rest of the class, including a discussion of the methods used to arrive at the answers.

EXTENSION

1. What is the approximate longitude and latitude where the flyways of Peregrines A, B, and C intersect?

2. From the perspective of a Peregrine Falcon, have the students describe in writing their migration from Iowa to Panama. Highlighting the major events of their migration, landscapes crossed over, and the dangers encountered while flying over the Gulf of Mexico are just a few of the topics they could include in their story. As a part of their creative writing story, have the students detail their experiences while flying over Belize, Honduras, Nicaragua, and Costa Rica.

Sketch view of lush tropical rain forest.



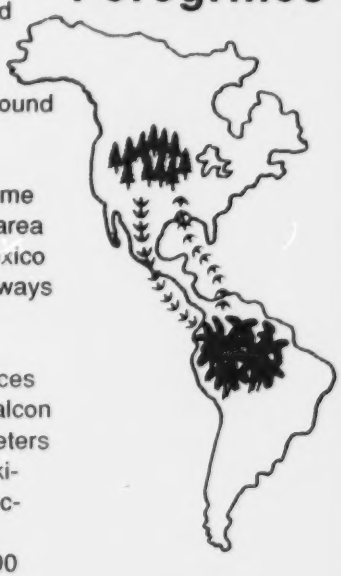
Migrating Peregrines

Three subspecies of Peregrine Falcons inhabit North America. These Peregrines differ slightly in appearance, breed in different areas, and migrate different distances.

• The Peale's Falcon (*Falco peregrinus pealei*) has a limited home range, nesting and wintering along the coasts of Alaska and British Columbia.

• The Arctic Peregrine (*Falco peregrinus tundrius*) is a threatened species that is found primarily in the Arctic and migrates as far south as Argentina.

• The endangered American Peregrine (*Falco peregrinus anatum*) has the largest home range of the Peregrine subspecies. Most American Peregrines found in the Iowa area and the central Rocky Mountains appear to winter at least as far away as central Mexico and Central America. Peregrines in the Southwest and southern California do not always migrate.



Usually flying during the day and resting at night, Peregrines can travel long distances in a remarkably short period of time. In the days of King Henry IV one Peregrine Falcon left France and was said to have been spotted 24 hours later in Malta, 2,160 kilometers (1,350 miles) away. To travel that distance in 24 hours, the bird averaged 144 kilometers (90 miles) per hour. The long distance record for Peregrine migration occurred when a Peregrine banded as a nestling in northern Canada in the summer of 1965 was found early the next year in Chaco, Argentina, 14,400 kilometers (9,000 miles) away.

The Human Connection

The connection between Peregrine Falcons and humans goes back a long time. In the Middle Ages, for instance, Peregrine Falcons were prized by nobility and sometimes nested on castles and other man-made structures. However, in recent history, the connection has not always worked to the Peregrine's advantage, particulary in North America.

An estimated 1,500 to 2,000 pairs of Peregrine Falcons once nested in North America. However, in the early 1950s the Peregrine population plummeted throughout North America. In 1973, Peregrines were put on the Endangered Species List, and recovery efforts began in the United States.

The Peregrine's rapid decline was due primarily to the use of pesticides such as DDT, which was first extensively used in the United States in 1947. Shortly thereafter, scientists began to suspect a link between the Peregrine's population plunge and DDT use.

Scientists found that DDT accumulates in the fatty tissue of birds and mammals and is passed upward through the food chains. For instance, birds feed on large quantities of insects which have eaten plants laden with DDT. A Peregrine Falcon that eats several of these contaminated birds would accumulate high levels of DDT.

Researchers discovered that high concentrations of DDT caused liver changes in Peregrines which led to a decline in certain hormone levels in the females. This, in turn, reduced the amount of calcium that the female could use to lay her eggs. This resulted in thin egg shells. When the adults tried to incubate the eggs, the eggs broke. Scientists also found that DDT changed the behavior of the parents, sometimes causing them to abandon their young.

Partly because of the negative effects of DDT on Peregrine Falcons, the use of DDT was banned in the United States in 1972. However, DDT, as well as many other pesticides, is still manufactured in the United States and sold to other countries (according to the National Audubon Society, one-third of all the pesticides exported from the United States are banned for use in the United States.)

Consequently, many developing countries in Central America and South America still use DDT. Peregrines and their prey migrate to these countries and, therefore, are still exposed to the effects of the pesticides.

In addition to the dangerous effects from DDT, Peregrines face a potentially more devastating threat—the destruction of tropical rain forests in Mexico, Central and South America. During winter, the forests in Central America are home to many North American birds. The massive clearing of these forests reduces the habitat available to the birds Peregrines eat. Scientists have already documented a decline in North American songbird populations because of tropical rain forest habitat destruction. Scientists are just beginning to study and document the effects of deforestation on not only Peregrines but millions of other animal and plant species as well.

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The Human Connection: THE PEREGRINE'S DEADLY LINK

GRADE LEVEL
3, 4, 5, and 6

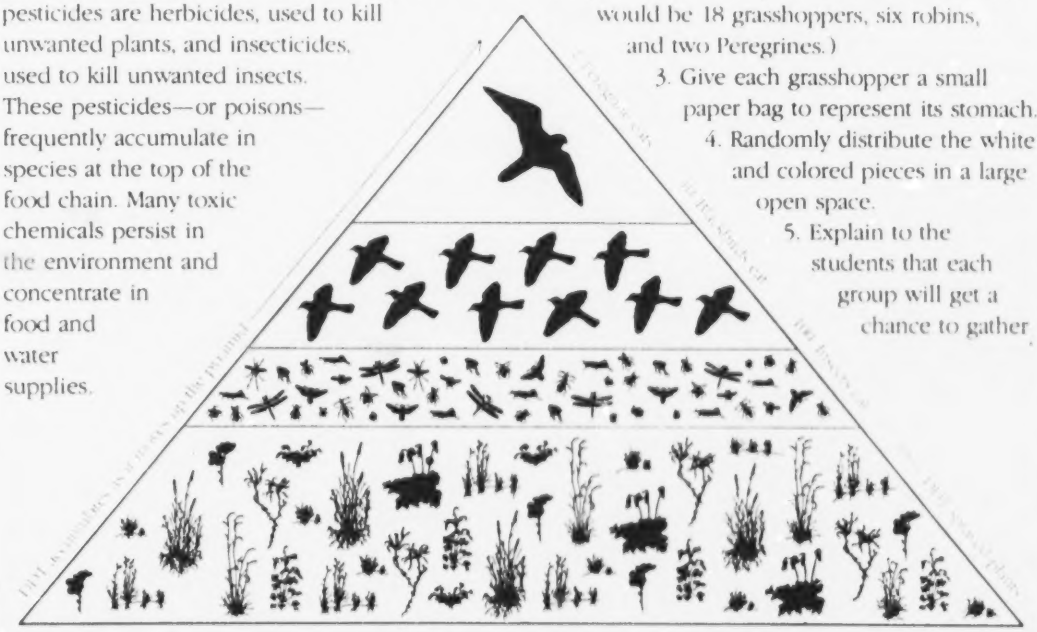
MATERIALS
- large open space
- white pipe cleaners and colored pipe cleaners (two thirds white, one third colored)
- or any other materials (two thirds white, one third colored) that can be picked up by the students easily (30 of these items per student is recommended)
- one paper bag per grasshopper
- chalkboard or easel paper

KEY VOCABULARY
pesticide
herbicide
insecticide
food chain

OBJECTIVES
Students will be able to: 1) give examples of how pesticides enter food chains; and 2) describe possible consequences of pesticides entering food chains.

METHOD
Students become "Peregrines," "robins," and "grasshoppers" in a highly motivating physical activity.

BACKGROUND
Scientists have developed pesticides to kill unwanted organisms. Two common types of pesticides are herbicides, used to kill unwanted plants, and insecticides, used to kill unwanted insects. These pesticides—or poisons—frequently accumulate in species at the top of the food chain. Many toxic chemicals persist in the environment and concentrate in food and water supplies.



The once widely used pesticide called DDT entered the food chain with damaging results to Peregrine Falcons and many other species. Birds ate insects contaminated with DDT. Peregrine Falcons then ate these birds and the poison became concentrated in their systems. Eventually, the build-up of this poison caused the shells of the eggs laid by Peregrines to be thinner than normal. Sometimes these eggs would not hatch, or they would be crushed by the adult bird during incubation.

Many pesticides are now prohibited in the U.S., but DDT, for example, is still used in other countries, remaining in the global food chain.

PROCEDURE
1. Tell the students that this is an activity about food chains. If they are not familiar with the term, spend time establishing a definition. (Food chain: a sequence or chain of living things in a community, based on one member of the community eating the member below it, and so forth; e.g., grasshoppers eat plants like corn; robins eat grasshoppers; Peregrines eat robins.)
2. Divide the students into three groups—grasshoppers, robins, and Peregrines. Work with approximately three times as many grasshoppers as robins, and three times as many robins as Peregrines. (For example, in a class of 26 there would be 18 grasshoppers, six robins, and two Peregrines.)
3. Give each grasshopper a small paper bag to represent its stomach.
4. Randomly distribute the white and colored pieces in a large open space.
5. Explain to the students that each group will get a chance to gather food, starting with the grasshoppers. After you delineate the boundaries, tell the Peregrines and robins to wait on the sidelines while the grasshoppers gather food. Give the grasshoppers 30 seconds to collect their food pieces, putting them in their paper bag stomach.
6. Tell the students that the robins will now hunt the grasshoppers while the Peregrines remain on the sidelines. The robins eat the grasshoppers by tagging them and taking their "stomachs." Grasshoppers which are "eaten" should go to the sidelines. Let the robins hunt for 45 seconds—or at least long enough for each robin to catch one or more grasshoppers. Some grasshoppers will be eaten and some will live.

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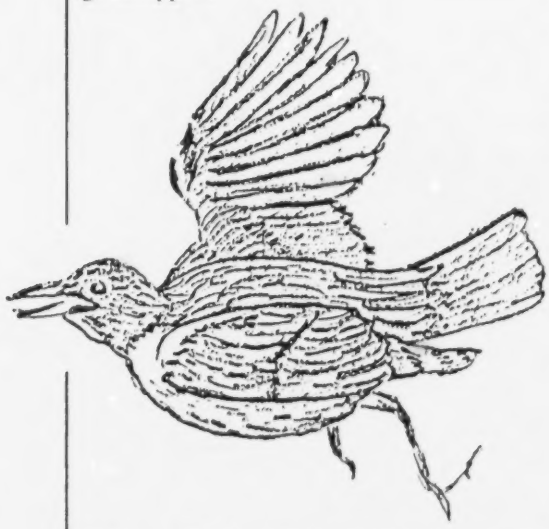
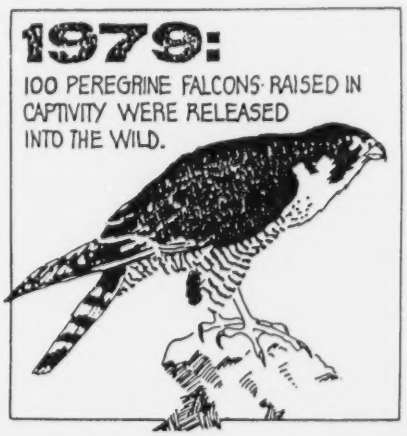
7. Now let the Peregrines hunt robins for 45 to 60 seconds (or whatever time works best.) Peregrines eat robins by tagging them and taking their "stomachs." Eaten robins should join the eaten grasshoppers on the sidelines. During this time period, robins which are not eaten by Peregrines may continue to hunt for remaining grasshoppers.



8. Reassemble the students into one group. Ask the students who were eaten to identify what type of animal they were and what ate them. Ask the Peregrines (and the grasshoppers and robins that were not eaten) to count the number of white and colored food pieces each has. List this information on easel paper or on the chalkboard.
9. Briefly discuss what pesticides are and why they are used. Tell the students that the pesticide DDT was sprayed on the crops eaten by the grasshoppers. In this activity the colored food pieces represent food contaminated with DDT. The grasshoppers that were not eaten by robins are dead if they have any colored food pieces in their stomachs. Any robin with more than one-half colored food pieces in its stomach is also dead. The Peregrine with the greatest number of colored food pieces is not dead, but has accumulated so much of the pesticide in its body that the eggs it produces during the following nesting season will be so thin that they will not hatch successfully.
10. Discuss the activity with the students. Have the students make observations about how a food chain works and how toxic substances can enter the food chain with varying results.

EXTENSION

1. Have students explore the important issue of pesticide use, human health, and extinction of wildlife. What are the trade-offs? Are the trade-offs worth it? What pesticides are banned in the United States but are being sold to other countries? What alternatives do developing countries have to using pesticides?
2. Offer and discuss possible alternatives to using pesticides. For example, some farmers are successfully using organic techniques (e.g., sprays of organic, non-toxic substances; crop rotation; companion planting); biological controls (e.g., predatory insects); and genetic approaches (e.g., releasing sterile male insects of the "pest species") in efforts to minimize damages to their crops and to the ecosystem.
3. Research other species that have been affected by DDT and other pesticides, such as the Brown Pelican and Bald Eagle.



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Cathy Meddin photo

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PEREGRINE MIX-UP

(Adapted from: Maple Seed Mix-Up from Nature Scope's Trees are Terrific)

GRADE LEVEL:

3 - 6

MATERIALS:

- pencil/pen
- slips of paper
- hat or other container
- bases

REQUIREMENTS:

food (4)
water (4)
shelter (4)
space (4)

HAZARDS:

pesticides (1)
deforestation (1)
illegal hunting (1)
collisions with powerlines and windows (1)

OBJECTIVES

Students will be able to: 1) identify the factors that a peregrine needs to survive; and 2) identify factors that hinder the survival of a peregrine.

METHOD

Play a running game to show that the peregrine's survival is unpredictable.

BACKGROUND

Peregrine Falcons are adapted in many ways that increase their chances of survival (see list of adaptations in Suited for Survival) Yet whether a peregrine reaches adulthood and reproduces is really a matter of chance.

PROCEDURE:

1. Before beginning, write the 'requirements' and 'hazards' listed in the margin on small slips of paper. Also write the words peregrine falcon on at least two slips. Then put all of the slips into a hat. (Note: the numbers in parentheses after each word are examples of the number of slips you can make for each hazard or requirement. You may need to adjust these numbers, depending on the size of your group. But don't add a lot of hazards - too many of them will make the game too hard to win.)

2. Next lead a discussion about the things peregrines need in order to thrive and survive: Food-their prey consists almost exclusively of smaller birds such as robins, jays, crows and pigeons; Water-they usually nest near water; Shelter-nests are typically located on the ledges of high cliffs usually in rugged mountain canyons but they also nest on ledges of tall buildings which form city canyons; Space-they hunt over a wide area, up to 18 miles from the nest.

3. Explain that although peregrines have many adaptations to help them meet the challenges of being a bird of prey, many never reach adulthood because of a number of hazards. These hazards include the use of dangerous pesticides and the loss of wintering bird habitat through destruction of huge tracts of tropical rain forests in Central America. Also migrating peregrines have to contend with stormy weather, collisions with powerlines and windows, and illegal hunting.

4. Then tell the students that they will be playing a running game. In the game two or more students will play a peregrine falcon. Everyone else will play the part of either a 'requirement' or a 'hazard'. (Read the list of requirements and hazards to the group.) Explain that the object of the game is for the "peregrine falcons" to survive by getting the requirements they need, while avoiding any hazards. But, just as with real falcons in nature, their survival will be a matter of chance.

5. When you are ready to play, take the kids to a large open area (either a big room or an area outside). Designate four bases that are located equal distances apart. (If you're playing inside, the corners of a room will work well.) Then have each child draw a slip of paper from a hat to find out what role he or she will be playing in the game. Tell the students to keep their roles a secret, and have them hang onto the slips so you can use them again later.

6. Count slowly to ten, and as you do, have the children run around the bases (in either direction). When you get to ten, each child should stop, then quickly go and stand near the base to which he or she is closest.(Make sure they don't all bunch up around one or two of the bases.)

7. Once the kids have settled into place, ask the one playing the roles of the peregrines to raise their hands. The group or groups without falcons can't win--they represent areas in which the peregrine does not live. Next have the others in the groups containing the falcons reveal what parts they're playing. (It's OK if both the falcons end up in the same group.) If a group includes one or more hazards, the group does not win. But if a group has no hazards and includes one of each of the requirements, then the group is a winner. When a group wins, point out the fact that the person playing the part of the peregrine survived purely by chance. The same thing happens to these birds of prey in nature.

8. You may have to play the game several times before a peregrine survives. Before you play a new game, have the kids put their slips back into the hat and redraw. (To make it easier for a group to win, delete one or two of the hazards and add a few more favorable conditions.)

A lone peregrine peers
between the bars of
his hack box. New
worlds await his flight!

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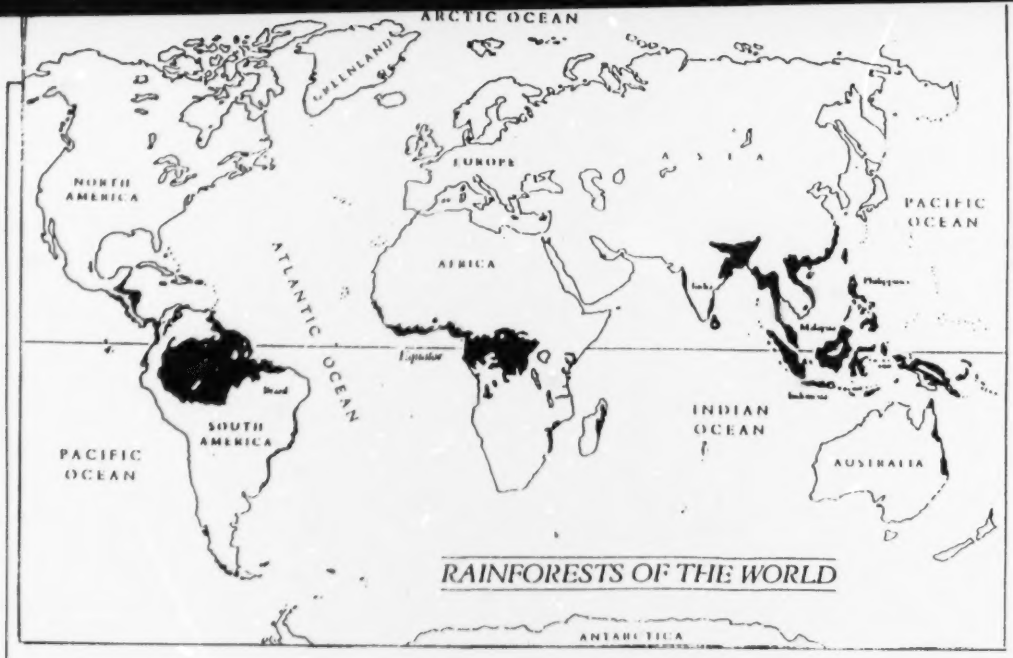


RAINFORESTS OF THE WORLD

The Human Connection: SIZING UP RESERVES

GRADE LEVEL
7 and 8

● ***Tropical Rainforests of the World***

	Central & South America	*Africa & Madagascar*	*South & Southeast Asia*
Current area tropical rain forest (sq. mi.)	2.1 million	0.7 million	0.8 million
Projected area tropical rain forest—year 2000	1.3 million	0.5 million	0.3 million
Leading causes of deforestation	Cattle raising; forest farming; fuelwood	Forest farming; logging; fuelwood	Logging; forest farming; fuelwood

OBJECTIVES

Students will be able to: 1) analyze some of the ways tropical rain forest destruction affects the plants and animals that live there or migrate there for part of the year; and 2) appreciate some of the ways species in a tropical forest community interact.

METHOD

Students interpret graphs and charts that show what happens when development fragments tropical forest. (Two 45-minute periods are recommended for this activity.)

BACKGROUND

Peregrine Falcons, some of which migrate to Central and South American rain forests, and millions of other species directly or indirectly depend on tropical rain forests to provide basic survival needs. Thus, what happens to these forests has a significant effect on what happens to Peregrine Falcons and the bird species they eat.

Tropical rain forests, located in a band around the equator extending roughly ten degrees north and south, make up about seven percent of the earth's land mass. This unique ecosystem is home to over one half of all species on earth. Scientists estimate that the area now covered by tropical rain forests is barely one-half of what it once was. Around 3.5 million square miles remain; that's about the size of the continental United States. Annually 40,000 square miles are destroyed (about the size of the state of New York) because of expanding urbanization, fuelwood needs, logging, expanding agricultural land, and unwise development practices. Habitat loss is the major reason plant and animal species are becoming threatened, endangered and extinct. And habitat destruction is considered the single greatest obstacle to helping many endangered species recover.

Because of the alarming rate of habitat destruction people around the world are beginning to search for questions and answers to slow the destruction of the tropical forests. For example, scientists currently do not know how big a tropical rain forest reserve should be to protect most of the species that live there. However, scientists working in Brazil are in the midst of a 20-year study to find out what happens when parts of a tropical forest are cut down and how the size of the remaining forests affect the plants and animals that live there.

MATERIALS

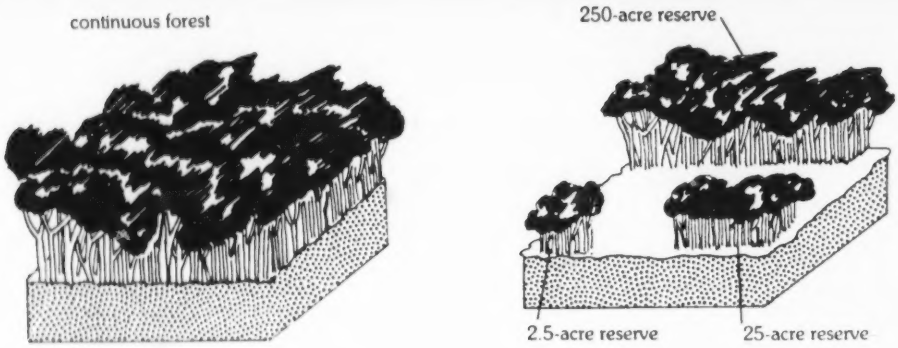
- copies of "Sizing Up Reserves I and II"

- chalkboard or easel paper
- small electric fan

KEY VOCABULARY

tropical rain forest
deforestation

*See activity page 11, sheet 3 for student map.



Before **After**

PROCEDURES

Part I

1. Copy the diagram above onto a chalkboard or sheet of easel paper. Have the students imagine that a road is going to be built right through the middle of a huge, continuous section of tropical rain forest. Also, some of the forested land is going to be converted into pastures for cattle and farmland for crops.
2. Ask the students how life in the forest might be affected by these changes. (Some animals might be killed on the road; others might move into less developed areas; more development might come into the area because of the access the road provides, causing further destruction of the tropical forest; entire species could become extinct.) List their predictions on a chalkboard or sheet of easel paper.
3. Have the students (activity works best with at least 20 students) stand close together with their arms in the air, forming a big group in an open area of the room. Tell them that each one of them is a tree, and together they represent a huge tract of undisturbed tropical rain forest.
4. Have one student in the center of the forest describe what he or she sees when looking "through the trees." Can he or she see the forest edge? you? the rest of the room? Is there much light down near the floor? (Point out that, in many tropical rain forests, the canopy is so thick that little sunlight reaches the forest floor.) Then turn a small electric fan on low at the edge of the forest and ask the center child if he or she can feel a breeze.
5. "Chop down" part of the forest by having some of the students near the edge move aside. Ask the center child to report any changes in what he or she can see.
6. Turn the fan on low again, and ask if the center child can feel a breeze. Once part of the forest has been cut down, the center child should notice more light near the floor, should find it easier to see through the trees to the edge of the forest, and should be able to feel a much stronger breeze. If none of these changes occur, chop down some more of the trees at the edge.
7. After the demonstration, ask the students what has happened to the area that used to be the middle of the forest. (It's now at or near the forest's edge.) Then ask them how this shift from forest middle to forest edge might affect the life within the forest.
8. Point out that many of the plants and animals that were adapted to living in the middle of the forest might not be able to survive at the forest edge. Ask the students to generate a list of reasons for this. (Changes in temperature, moisture level, air circulation, light intensity and so on would occur at the forest's new edge. For example, the former "middle of the forest" would now receive much more sunlight than before, raising the overall temperature of the area. The area would also receive more wind, which could make the new edge drier than when it was part of the forest's middle.) Again, list the students' answers on the chalkboard or a piece of easel paper.

Part II

1. Using the information in "What's Happening in Brazil?" explain the Minimum Critical Size of Ecosystems project (MCS). Make sure the students understand that the forest in the area where the scientists are working was going to be cut down anyway. By directing where the loggers cut, the scientists have been able to create reserves, or forest "islands," of specific sizes.
2. Explain that the scientists are trying to determine how big a reserve might have to be in order to protect as many of the species that live in a tropical forest as possible. For example, could most of the plants and most of the birds, mammals, amphibians, and other animals found

in the Brazilian rain forest survive in a 2500-acre (1000-ha) reserve or would it take a 25,000-acre (10,000-ha) reserve? Or one that's even larger? (Note: Explain that new research shows that some species are so specialized that they may become extinct if even a small area in certain parts of a rain forest is destroyed.)

3. Pass out copies of "Sizing Up Reserves I" so the students can see some of the things that have happened in the isolated reserves studied in the MCS project. Explain that the charts and graphs show real data the scientists have collected from 2.5-acre (1-ha) and 25-acre (10-ha) reserves during the reserves' first two years of isolation.

4. Pass out copies of "Sizing Up Reserves II" and have the students answer the questions using the charts and graphs. When the kids are finished, ask them if any of the changes they predicted occurred in the reserves the scientists studied. Talk about the changes, then go over the answers to the questions (see the end of this activity). As you go over the answers, discuss the fact that all animals and plants depend on specific physical conditions in their habitats in order to survive. For example, when light conditions change in the forest areas the scientists were studying, many of the butterfly species that had lived in the forest's interior disappeared. And trees that were once in the interior were damaged and even knocked over by increased wind.

5. Finally, ask the students if they think either a 2.5- or 25-acre (1- or 10-ha) reserve would be large enough to preserve the variety of life found in the Brazilian rain forest the scientists are studying. Tell them that even though the MCS project is far from over, scientists are predicting that a Brazilian rain forest reserve would probably have to cover million of acres in order to protect most of the species that live there.

What's Happening In Brazil?

In 1977, Dr. Thomas Lovejoy of World Wildlife Fund (WWF) was looking for a place to try an experiment. He wanted to find out what happens when parts of a tropical rain forest are fragmented by roads, pastures, and other human developments. He also wanted to find out how much forest it might take to make a reserve large enough to support the plants and animals that normally live in a rain forest.

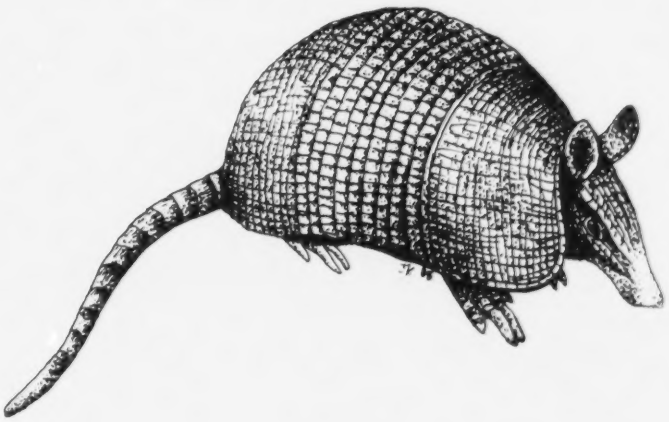
Lovejoy knew that, under Brazilian law, any land development project in the Amazon region of Brazil must leave half of the area forested. He discovered some land that was going to be converted to pasture and asked if he could direct which parts of the the total areas would be left undisturbed. The local government, Brazilian scientists, and the ranchers agreed to cooperate.

In 1979, scientist from WWF and Brazil's National Institute for Amazon Research began mapping out more than 20 areas within the virgin rain forest. These areas would eventually become reserves of varying sizes: 2.5, 25, 250, and 2500 acres (1, 10, 100, 1000 ha). There was also one 25,000 acre (10,000 ha) reserve. Then, with help from more scientists and some of the ranchers, they obtained a "before" picture of each future reserve by taking an inventory of the plants and animals in each one.

Finally, in 1980, the ranchers started cutting down the forest. The reserves, once part of a continuous forest, became isolated "islands" of trees. And the scientists immediately started monitoring the changes that occurred in each "island." So far only nine of the reserves have been isolated, or separated from the continuous forest.

The goal of the experiment: to watch the island degrade in order to observe which animals and plants leave or die out, and in what order. Scientists hope to discover the minimum critical sizes reserves must be for given species to survive. The experiment will continue until at least 1999.

The Human Connection: SIZING UP RESERVES



1. Which of the following statements best describes what happened to the *number of birds caught per net per hour in the reserves?*

   a. The number nearly doubled just after the reserves were isolated and then dropped dramatically. After 96 weeks the number was lower than before the reserves were isolated.

   b. The number slowly increased in the reserves after the reserves were isolated and kept increasing for 96 weeks.

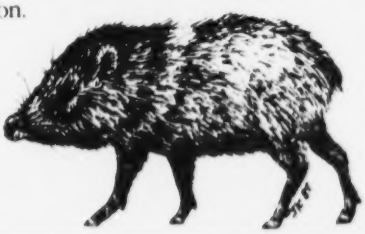
   c. The number remained unchanged.

2. Which of the following statements best describes the second graph?

   a. The number of butterfly species decreased steadily for two years after the reserves were isolated.

   b. Immediately after the reserves were isolated, the number of butterfly species dropped. But after two years the number was the same as before isolation.

   c. Immediately after the reserves were isolated, the number of butterfly species dropped. But after two years there were more kinds of butterflies than before isolation.



3. Which of the following statements best describes the information in Table 1?

   a. Most of the mammals present in the continuous forest were just as common in the reserves.

   b. Most of the mammals present in the continuous forest were absent from the reserves.

   c. Most of the mammals were rare in both the reserves and the continuous forest.

4. Look at the information in Table 2. Did a greater percentage of trees die in the reserves or in the continuous forest?

5. After three years, no barred leaf frogs were found within the 25- or 2.5-acre reserves. Several other kinds of leaf frogs had disappeared as well, even though other kinds of frogs were still found in the reserves. Given the following information, why do you think the barred leaf frogs disappeared?

   - Barred leaf frogs lay their eggs in puddles.
   - White-lipped peccaries are piglike mammals that live in herds. These herds need thousands of acres of undisturbed forest in order to find all the food they need to survive.
   - When white-lipped peccaries wallow in the mud they create small puddles.

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EXTENSION

1. Have the students gather more information about tropical rain forest deforestation to become more aware of the global effects of deforestation. For information contact:

a. Rainforest Action Network
300 Broadway, Suite 28
San Francisco, CA 94133
(415) 398-4404

b. World Wildlife Fund-U.S.
1250 24th Street, N.W.
Washington, D.C. 20037
(202) 293-4800

c. World Resources Institute
1735 New York Avenue, N.W.
Washington, D.C. 20006
(202)638-6300

d. International Union for Conservation of Nature and Natural Resources
Publications Division
World Conservation Centre
Avenue du Mont-Blanc
1196 Gland, Switzerland

2. Have the students research one of the following topics, then conduct a class debate stressing the major points of these complex issues: A) Causes of tropical rain forest deforestation; B) The roles that the United States and other developed countries play in tropical rain forest deforestation.

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Answers: "SIZING UP RESERVES"

1. a. When part of the forest was cut down, the birds that lived there crowded into the reserves, and at first more birds were caught per net per hour. However, because the reserves didn't have enough space and food for all the birds, many of them died or left and the number of birds caught per net per hour soon dropped. In comparison, the number of birds caught per net per hour in the continuous forest stayed about the same before and after the reserves were isolated.

2. c. Many of the original butterfly species disappeared from the reserves after the reserves were isolated, and others survived only in the centers of the larger reserves. The increase in the total number of butterfly species present in the reserves was the result of light loving butterfly species moving into the light-filled edges of the reserves.

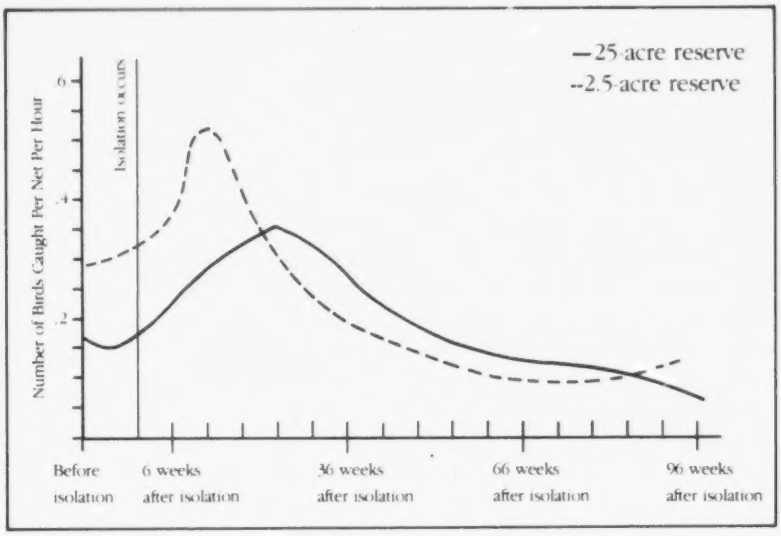
3. b. The reserves were too small for most of the mammals shown in Table 1. In fact, of all the primates, only red howler monkeys were able to survive in large numbers in the larger reserves. (Unlike most of these other primates, which eat mainly fruit, red howler monkeys eat leaves. When the reserves were isolated many of the fruit trees were chopped down. But the red howler monkeys could still find plenty of leaves to eat.)

4. In the reserves. The number of standing dead trees and the number of trees uprooted or broken by wind or the fall of another tree were all higher in the reserves than in the continuous forest. And the numbers jumped within two years. For example, the number of standing dead trees in one 25-acre reserve was 9 the first year and 65 the second year.

5. The reserves were too small for the white-lipped peccaries so they disappeared. When the peccaries disappeared from the reserves their wallows slowly dried up. And once the wallows were gone the frogs had fewer puddles to lay their eggs in and so they disappeared too.

The Human Connection: SIZING UP RESERVES

GRAPH 1



Note: There were a total of 16 nets. The graph shows the average number of birds caught per net per hour.

TABLE 1

Mammal	Continuous Forest	25-Acre Reserve	2.5-Acre Reserve
Red howler monkey	very abundant	very abundant	absent
White-faced saki (monkey)	rare	absent	absent
Golden-handed tamarin (monkey)	abundant	absent	absent
Collared peccary (pig-like mammal)	abundant	absent	absent
Acouchi (large rodent)	very abundant	rare	absent
Paca (large rodent)	abundant	absent	absent
Rice rat	rare	rare	rare
Nine-banded armadillo	very abundant	rare	absent

GRAPH 2

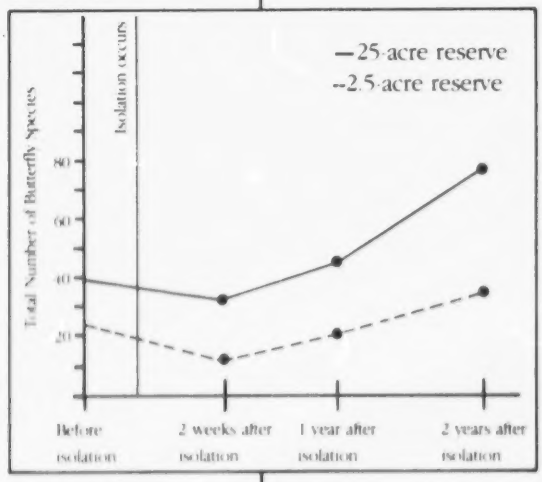


TABLE 2

Death Rates of Trees 2 Years After Isolation	
2.5-acre reserve	2.6%
25-acre reserve	2.6%
continuous forest	1.5%

The 2.5- and 25-acre reserves were hotter and drier than the continuous forest. And temperatures between the edges and 300 feet within one 250-acre reserve varied by as much as 8°F.

Diving Into The Future: RACE TO RECOVERY

GRADE LEVEL
5 and 6

OBJECTIVES
Students will be able to: 1) interpret the classifications of threatened, endangered, and extinct; 2) infer some of the causes as to why wildlife species might be classified as threatened, endangered, or extinct; and 3) describe how the classification of the Peregrine Falcon as an endangered species has helped recovery efforts.

METHOD
Students run a race to illustrate human impact on wildlife.

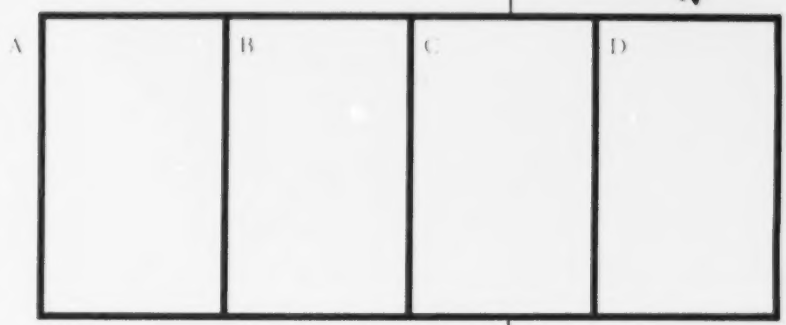
BACKGROUND
Since life began, species of animals and plants have come and gone. Extinction, as a natural process, has always been a way of life, but currently the extinction rate is hundreds of times faster than when the dinosaurs roamed some 60 million years ago. Sabre-tooth tigers, mastodons, and the great auk once flourished, but for reasons not fully understood they have vanished. Although the general rule of thumb is that between 20 and 40 animal species depend on a plant species for its survival, no one really knows why some animals remain abundant for millions of years while others only survive for a relatively short period of time. However, today scientists are beginning to grasp that the main reasons for the extinction of certain animals and plants are exploitation and habitat loss.

Because of the dramatic acceleration of species loss, Congress enacted the Endangered Species Act in 1973. The purpose of the law was to provide a means of assuring the preservation of plant and animal species that are currently in danger of becoming extinct (endangered) or that may become so in the foreseeable future (threatened).

Although it appears to be death, extinction is actually the end to birth. In simple terms the population of a species has died out either from natural causes or because of human interference. Animals are more prone to extinction if they: 1) negatively affect people's activities; 2) depend on several different habitats (i.e., migrating animals); 3) have very specialized food or nesting requirements; 4) have difficulty adapting to changes in the environment; 5) have small broods, long gestation periods, and reach sexual maturity long after birth; 6) are naturally rare; 7) are over exploited.

Since the Peregrine Falcon was placed on the Endangered Species List in 1973, recovery efforts have been remarkable. Today Peregrines may not be legally killed, hunted, collected, sold, harassed, harmed, pursued, shot, trapped, wounded or captured. These restrictions have nurtured the recovery of the Peregrine Falcon.

PROCEDURE
1. This race symbolizes the varying degrees of impact humans have on wildlife. Divide the space available into four equal rectangles. Delineate the space with traffic cones. Starting line A represents the global human population and space B represents highly impacted wildlife due to its proximity to human activity. Whereas, space D represents less wildlife impact due to its greater distance from human activity.



2. In space B put all the black tokens (enough for two tokens for each student). In space C place all the yellow tokens and in space D place all the green tokens. Be sure that each space has two tokens for each student and that the tokens are randomly spread throughout the space.
3.Tell the students that they are going to run a race, trying to gather as many tokens (or animals) as they can. Be sure to point out that they can only pick up one token per run. At this time, designate one student as a recorder and two students as counters. The rest of the students, starting behind line A, must run and pick up a token, returning to behind line A

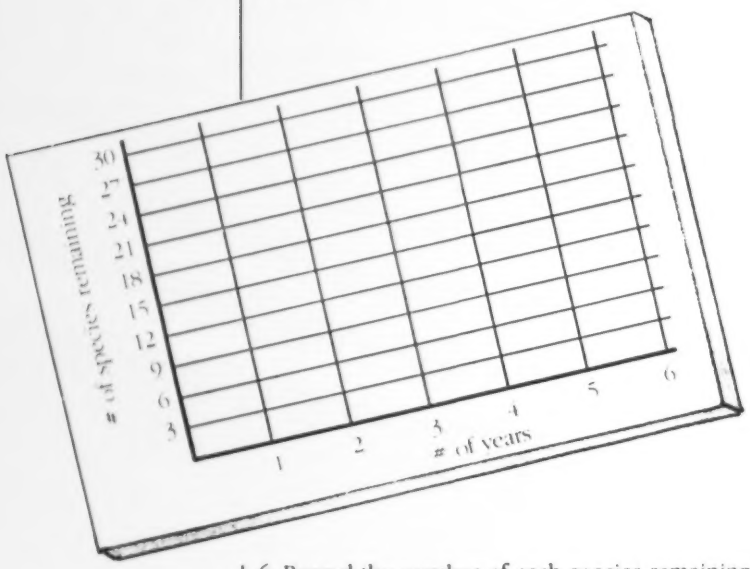
MATERIALS
- gym or large open area
- tokens or various colored pieces of construction paper (1/3 black, 1/3 yellow, 1/3 green,—allow two pieces of each color per student)
- one envelope per student
- easel paper

KEY VOCABULARY
threatened
endangered
extinct

before running to pick up another token. Have the students store their tokens behind line A in the envelope provided.

4. Students may get any color token they would like, but most will no doubt choose the tokens closest to them (the black tokens).

5. Have the students freeze in position every 60 seconds (60 seconds=one year). Have the students practice "freezing" before you begin. At each 60 second interval have the designated student record the number of species remaining (black species, yellow species, green species) in graph form on the easel paper. You may want to vary the interval based on the speed of your students.

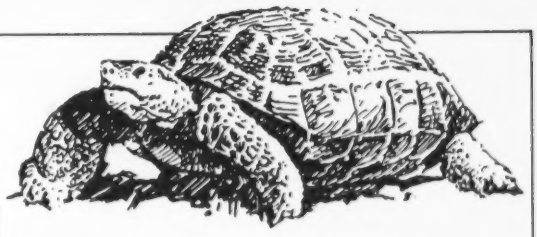


6. Record the number of each species remaining on three separate graphs or use separate colors on the same graph. Note that the accompanying graph is for 15 students.

7. When most of the tokens are collected stop the race, recording the final data of each species. Try to plot at least four intervals of each species.

8. Introduce the concepts of extinct, endangered, and threatened, explaining that each color of tokens represents a certain species. Have the students interpret the completed graph(s) to determine if and when a certain species became extinct, endangered, or threatened. Most likely the black species will become extinct, the yellow species endangered, and the green species threatened.

9. You may want to use actual species to illustrate the point, for example:



Threatened
Arctic Peregrine Falcon
Desert tortoise
Utah prairie dog

Endangered
American Peregrine Falcon
Whooping Crane
Least Tern

Extinct
Passenger Pigeon
Carolina Parakeet
Dodo

10. Explain to the students that in this activity they represented human impact on the species. Generate a list of human impacts or activities such as: overpopulation, introduction of exotic species, unwise development, habitat destruction, use of pesticides, exploitation like overhunting and illegal trade of wildlife, etc.

11. Through the use of the graph illustrate that human activity, and particularly close activity, can detrimentally affect wildlife populations. Recognizing this, humans classify wildlife as threatened or endangered, encourage the development of recovery plans, and try to prevent extinction.

12. Discuss how the classification of the Peregrine Falcon as an endangered species has helped the Peregrine recovery efforts.

EXTENSION

1. Do the activity with half as many students, in the same amount of time, using the same number of species. What influence does human population pressure have on the use of natural resources?

2. Have the students research the listed species to determine how and when each species became threatened, endangered or extinct.

3. Ask the students to create a narrative paper or poem describing what the earth would be like without mammals, birds, insects, reptiles, amphibians or fish.

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The Iowa peregrine reintroduction logo is designed to aid in the identification of the peregrine falcon and to illustrate some of the biology of the bird.

1. The thick dark moustache is quite recognizable on this crow-sized bird.
2. The wings are long and pointed in a swept-back fashion.

The buildings of Cedar Rapids are represented with the multiple levels of building tops. These levels increase the perching opportunities of the young falcons. Also, the buildings' "concrete canyons" effect provide the updrafts necessary for successful flight. The traditional nesting sites (eyries) of the peregrine are represented by the cliff face in northeastern Iowa. Hopefully, through the efforts of the Peregrine Falcon Reintroduction Programs in the Midwest and Great Lakes regions and the Iowa Department of Natural Resources' Nongame Program, these areas will once again contain peregrine falcons.

PEREGRINE WRAP-UP

GRADE:

3 - 8

MATERIALS:

- 3 x 5 cards
- boundary markers

VOCABULARY:

adaptation
food chain
talons
raptors
true
streamlined body
carrion
false
long pointed wings
deforestation
hacking
owls
rain forest
pesticides
hawks
diurnal
DDT
eagles
nocturnal
migration
falcons
endangered
predator
vultures
threatened
prey
fledgling
habitat
fostering
notched beak

OBJECTIVES:

Students will review what they have learned about peregrine falcons through an active question and answer game.

PROCEDURE:

1. Before starting, write the words listed in the margin on 3 x 5 cards (one per card). (Helpful hint: laminate the cards for longer wear.)

2. Divide students into two teams with an even number of students on each. Mark off two parallel lines on the ground or floor approximately 16 feet apart. Have Team A line up behind one line and Team B behind the other. They should face each other. Once on line have the students on each team count off (one, two, three, four, five, etc.). The same numbers should be found on each team. i.e. each team has a number "one", a number "two", and so on.

3. Then tell the students that you have the "answers" to questions about the peregrine falcon written on 3 x 5 cards. Scatter the cards in the middle between the two teams (it doesn't matter if the answers are showing or not). Tell the students that you will ask a question and then call a number. The two students with that number will run to the middle and search through the cards until they find the right answer, at which time they will hold it up. The team to find the answer, gets a point. Once the answer has been found, the card is returned to the pile, the students return to their lines and the next question is asked. If the answer cannot be found a new number is called. If no one knows the answer, it is revealed and then asked again later.

4. The following are some additional rules:
   1) Each card is worth a point so if a question calls for more than one answer, points are awarded accordingly. On multi-answer questions it is possible that both teams could score.
   2) Students are not allowed to point or shout out an answer to their teammate.
   3) If a student's number has not been called he or she must stay behind the line.
   4) Opposing players, while searching for an answer, cannot in any way hinder their opponent, i.e. they cannot body block them(!), steal a card from their hands, cover cards with their body so their opponent cannot get at them, etc.

5. The following are possible questions to ask. You may want to add your own "answers" and "questions" to those provided.

1. Name two serious threats to the peregrine's survival_____ and _____ PESTICIDES & DEFORESTATION

2. What special adaptation do falcons use to break the vertebrae of their prey? _____ _____ NOTCHED BEAK

3. True or False. Peregrines prey almost exclusively on small mammals such as mice and rabbits. FALSE (They feed almost exclusively on smaller birds.)

4. Find five different birds of prey. _____, _____, _____, _____, _____ OWLS, HAWKS, EAGLES, FALCONS & VULTURES

5. True or False. Peregrines usually strike their prey with clenched talons, knocking the bird senseless. TRUE

6. What dangerous pesticide is known to cause the shells of the eggs laid by peregrines to be thinner than normal?_____ DDT

7. What habitat, important to the peregrine, is being destroyed in Mexico, Central and South America? _____ _____ RAIN FOREST

8. True or False. Peregrines "dive bomb" at speeds of 50-60 miles per hour. FALSE (Peregrines have been clocked at more than 200 miles an hour in their dives after prey.)

9. Find two adaptations that help falcons fly quickly. _____ _____ & _____ _____ _____
STREAMLINED BODY & LONG POINTED WINGS

10. When a plant or animal is close to being extinct what word do we use? _____
ENDANGERED

11. A baby peregrine falcon, just learning to fly is called a _____ . FLEDGLING

12. Putting a peregrine falcon into a nest to be raised by adult birds until it can survive on its own is called _____ . FOSTERING

13. When peregrine falcons move from one region to another, on a seasonal basis - we call it _____. MIGRATION

14. The arrangement of food, water, shelter and space necessary for an animal to survive is called _____ . HABITAT

15. Chemicals used to control populations of undesirable plants and animals is called _____
PESTICIDES

16. What do you call an animal that hunts down and eats another animal? _____ The peregrine is an example of one. PREDATOR

17. What do you call it when plants are eaten by grasshoppers, grasshoppers are eaten by robins and robins are eaten by peregrines? _____ _____ FOOD CHAIN

18. Vultures, which are a kind of raptor, eat dead meat. What is another name for dead meat? _____ CARRION

19. Birds that prey on other animals are called _____ . RAPTORS

20. A physical characteristic or behavior that helps a peregrine survive is called _____ . ADAPTATION

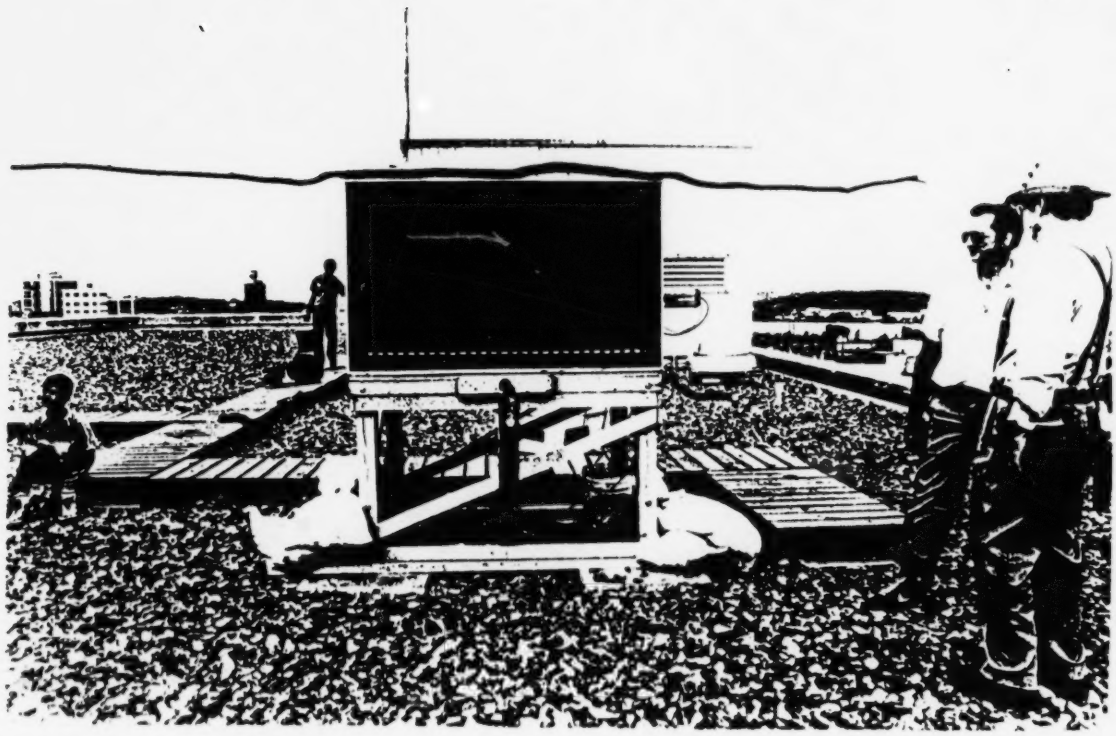
21. The cutting of trees in the rain forest of Mexico, Central and South America is called _____ .
DEFORESTATION

22. Peregrine falcons are active by daylight. Animals active during the day are called _____ . DIURNAL

23. Owls are active by night. What do you call animals active at night? _____
NOCTURNAL

24. What do you call animals that are hunted down and eaten by other animals?_____
PREY

25. Putting peregrine falcons in a controlled environment, without adults, until they can survive on their own is called _____ .
HACKING



The hack box--new home for the falcons. It comes fully equipped with perches for flight training and a great view of downtown Cedar Rapids.

Cathy Meddin photo

Glossary

adaptation: a physical characteristic or behavior that helps a plant or an animal survive in its habitat. For example, the Great Horned Owl, which hunts at night, has large eyes. This adaptation helps it have good night vision to hunt in low light.

bird of prey: raptor.

carrion: dead flesh.

chlorinated hydrocarbons: organic chemical compounds used to kill unwanted plants and animals. DDT and other pesticides are chlorinated hydrocarbons that are easily spread throughout the earth by wind and by accumulating in plants and animals. Because DDT has an approximate half-life of 20 years, it can have damaging effects on ecosystems and nontarget species.

deforestation: the process of clearing of forests.

diurnal: active by daylight; the opposite of nocturnal.

endangered: a species in danger of becoming extinct throughout all or a significant portion of its range.

fledgling: young bird ready for flight.

flyway: fly routes established by migrating birds.

food chain: a sequence or chain of living things in a community, based on one member of the community eating the member below it and so forth. For example, grasshoppers eat plants such as corn; robins eat grasshoppers; and Peregrine Falcons eat robins.

fostering: putting chicks into nests to be raised by adult birds until they can survive on their own.

habitat: the arrangement of food, water, shelter or cover, and space necessary for an animal to survive.

hacking: putting chicks in a controlled environment without adults until they can survive on their own.

herbicide: a pesticide used to kill plants.

home range: the area in which an animal travels during its normal activities; not to be confused with territory—the area defended by an animal against others of the same species.

insecticide: a pesticide used to kill insects.

migration: seasonal movement from one region to another.

nocturnal: active by night; the opposite of diurnal.

pesticide: any chemical used to control populations of undesirable plants and animals.

predator: an animal that lives by killing and eating other animals.

prey: animals that are killed and eaten by other animals.

raptor: a bird that is predatory. Eagles, hawks and owls are raptors.

scrape: a depression in soil, sand or gravel made by Peregrine Falcons to lay their eggs.

threatened: a species in danger because of decline in numbers. A threatened species is not in immediate danger of extinction, but is likely to become endangered if it isn't protected.

tropical rain forest: a type of forest located approximately ten degrees north and ten degrees south of the equator characterized by year-round warmth and moisture.

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PEREGRINE FALCON FACT SHEET

SPECIES INFORMATION

*The scientific name for peregrine falcon is Falco peregrinus which means wandering falcon. During migration, peregrines may travel great distances. Peregrines nesting in the Arctic are known to migrate to Central and South America during the winter.
*Peregrines are a bird of prey (raptor) and part of the Falconidae (falcon) family. There are 5 falcon species in the United States: Peregrine, Gyrfalcon, Prairie falcon, Merlin and American Kestrel. The peregrine and merlin formerly nested in Iowa, now only the kestrel (sparrow hawk) currently nests here.
*Peregrines are a crow-sized bird. Females are larger and weigh 32-34 ounces while males weigh 18-20 ounces. From beak to tail peregrines are 13 to 16 inches long. During their first year, the young falcons will have a chocolate brown plumage with streaks on the belly. After one year of age, they will obtain the adult coloration which is slate blue on the back, white under the chin with black speckling and salmon on the breast. All peregrines have the dark moustache stripe under each eye.

GROWTH AND DEVELOPMENT

*Female peregrines lay a clutch of 3 to 5 eggs. Both the male and female incubate the eggs and tend the young after hatching. Incubation is 31 days.
*Nests are simply a scrape in the dirt or gravel of a cliff ledge or building.
*When hatched, the young peregrines are about the size of chicken chicks (2 ounces) and have a light coat of white down. Unlike chickens, peregrines are helpless for the first couple weeks.
*Young peregrines (eyases) can walk when 2 to 3 weeks old and start tearing their own food that the adult brings when about a month old. When they are 6 weeks old they begin to fly but still cannot capture their own food. After they have been flying for about a month they start catching prey. When they are 9 to 12 weeks old, they hunt and care for themselves.
*Males develop faster than females.
*Young peregrine migrate out of northern climates to the southern U.S. or further.
*Sixty percent of the young falcons die during their first year. After their first year, they stand an 80 percent chance of survival in subsequent years and may live to be 12 to 15 years old.
*A peregrine is usually sexually mature at 3 years of age, however younger birds have been known to nest.

NOTABLE FEATURES

*Peregrines tend to be monogamous and mate for life. Courtship includes aerial dives and the male presenting food to the female. Mating occurs in spring, normally April.
*Peregrines can fly straight-away at 60 mph. When they fold their wings and go into a dive (stoop) they can reach speeds over 200 mph.
*Peregrines feed primarily on other birds such as pigeons, starlings, blackbirds, ducks, jays, doves, and sparrows. An adult bird eats one to two blackbird sized birds per day.
*The peregrine population has never threatened populations of other birds. As a predator, the number of peregrines is much less than the populations of the

birds they feed on. They are also very territorial so within suitable habitat, the birds are exclusively spaced. Some territories and nests in Europe have been documented for hundreds of years.

IOWA'S PEREGRINE PLAN

*Peregrine falcons are a state and federal endangered species. Prior to 1960, there were over 350 nests in the eastern U.S. By 1964 not a single peregrine could be found in the eastern U.S.
*DDT pesticides were found to be the cause of the decline. The pesticides were ingested by birds who ate insects who in turn were eaten by peregrines. With each step up the food chain, the negative effects increased. The pesticides inhibited the peregrines (and bald eagle's) ability to produce enough calcium for the eggshells. This caused vast reproductive failure. Eventually there were no young to replace the adult birds and the population plummeted.
*The dangers of DDT were eventually recognized and the pesticide was banned in the U.S. in 1972. Thus the peregrine has already once been proven as a valuable indicator of the quality of our environment.
*Peregrines in Iowa nested primarily along the Mississippi River in Allamakee, Clayton and Dubuque counties, plus along cliffs in Linn, Johnson and Black Hawk. The last Iowan birds nested in 1956.
*To restore peregrines, biologists from Cornell began "hacking" young falcons in 1974. Hacking involves placing captively produced young falcons in a hack box. The birds are held and fed in the box for several days. Then the box is opened and the birds are free to learn how to fly. Because they cannot capture their own food, they continue to be fed at the box for 6 more weeks. The ultimate goal is to imprint the young on the area so when the birds are sexually mature, they come back to the area to nest.
*In the midwest, peregrines have been hacked at Minneapolis, Rochester, Weaver Dunes, Tofte, Finland, Virginia, Calumet (MN); Chicago (IL); Detroit, Grand Rapids, Isle Royal, Pictured Rocks (MI); Milwaukee, Madison (WI); Omaha (NE). This is Iowa's first year of releasing peregrines as part of the Midwestern effort of the Eastern Peregrine Recovery Program. Midwestern releases are coordinated by Dr. Pat Redig, of the Raptor Center, University of Minnesota.
*Some peregrines released in the midwest have returned to the same areas to nest. Others have nested in adjacent states. There were 5 urban nests and 3 rural nests in 1988 in the midwest. The recovery goal for the midwest is 20 to 30 nests in the region. Iowa hopes to release 50 or more peregrines and have 5 nests by 2000. It will take 5 years for Iowa to complete the releases.
*In Iowa, the peregrine project is being conducted by the Iowa Department of Natural Resources' Nongame Program. The Nongame Program is funded strictly by donations to the Fish and Wildlife Protection Fund Checkoff on the state income tax form. Thus it will require the support of all Iowans to make the Nongame Program and Peregrine Falcon Project successful.
THANK YOU FOR YOUR SUPPORT!!

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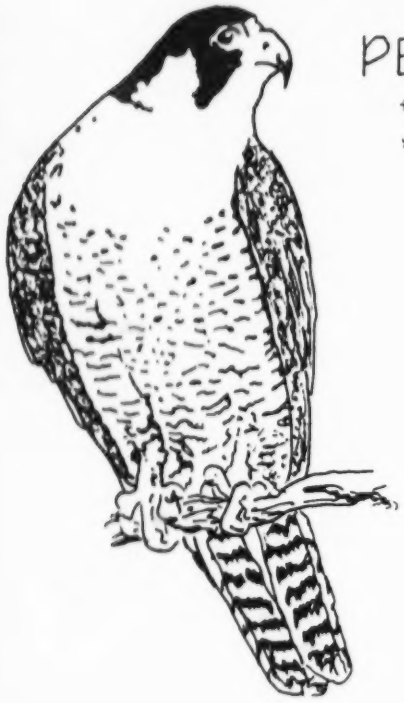
NONGAME PROGRAM PEREGRINES



PEREGRINE FALCON (ROCK HAWK, DUCK HAWK)

* WINGSPAN: 43-46"
* LENGTH: 15-20"

A LARGE, DARK FALCON WITH A WIDE DARK MOUSTACHE; DARK HEAD APPEARS HOODED. STREAMLINED WINGS ARE SWEPT BACK. AWE-INSPIRING RAPTORS TO WATCH BECAUSE OF THEIR POWER AND GRACE IN FLIGHT. THIS SPECIES NESTS PRIMARILY ON CLIFFS BUT HAS USED TREES, BUILDINGS AND RECENTLY, BRIDGES. FLEDGLINGS (YOUNG) OFTEN CHASE AFTER AND CATCH FLYING INSECTS SUCH AS DRAGONFLIES AND BUTTERFLIES. PEREGRINES PERFORM SPECTACULAR DIVES (STOOPS) FROM GREAT HEIGHTS STRIKING BIRDS AT HIGH SPEEDS (UPWARDS OF 180 M.P.H.)

AMERICAN KESTREL (SPARROW HAWK)

* WINGSPAN: 20-24"
* LENGTH: 9-12"

SMALLEST NORTH AMERICAN FALCON AND ONE OF OUR MOST COMMON AND COLORFUL RAPTORS. HEAD IS GRAY WITH RUFOUS CROWN PATCHES AND WHITE CHEEKS WITH 2 BLACK MOUSTACHE MARKS. USUALLY SEEN HOVERING OR SITTING ON EXPOSED PERCHES, SUCH AS POLES, WIRES OR TREETOPS, WHERE IT HUNTS RODENTS, INSECTS, BIRDS, LIZARDS OR SNAKES. KESTRELS NEST IN TREE CAVITIES BUT WILL READILY USE HOLES IN CLIFFS AND CREVICES IN BARNS AND BUILDINGS AS WELL AS NEST BOXES.

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ATTENTION:

The following information and questions about peregrines were printed in the "Nongame News," Summer, 1989, Vol. 5, No. 2, and written by Laura Spess Jackson, Urban Biologist for the Iowa Department of Natural Resources. This peregrine falcon recovery project did happen and perhaps as many as 50 birds are to be released in Iowa over the next few years.

Each bird costs about $2,000 and financing comes primarily from the Fish and Wildlife Fund Contribution on Iowa income tax returns and donations. Many conservation organizations, agencies, corporations and individuals have worked with the Nongame Program to make the peregrine project a reality.

Questions, comments, address corrections to the mailing list should be directed to:

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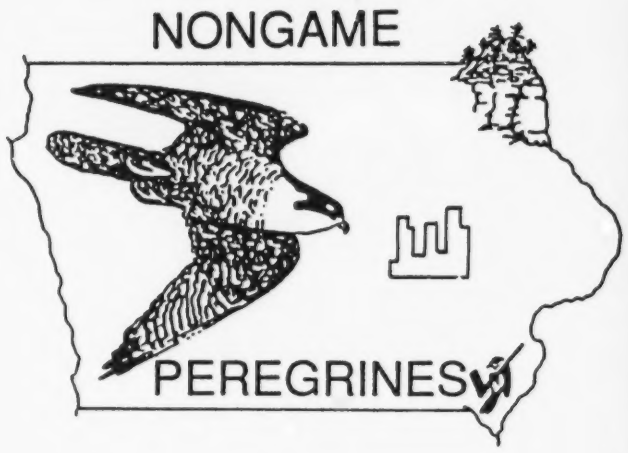
Iowa Department of Natural Resources
Nongame Program
Wildlife Research Station
Route 1
Boone, Iowa 50036
515/432-2823

OR

Jim Hansen, Nongame Biologist
Iowa Department of Natural Resources
Nongame Program
Clear Lake Research Station
1203 North Shore Drive
Clear Lake, Iowa 50428
515/357-3517



start a peregrine recovery project. Peregrine falcons are crow-sized birds of prey which formerly nested on cliffs along the upper Mississippi and Cedar Rivers. Peregrines are best known for their flying ability. These flying machines can reach speeds of nearly 200 miles per hour when they go into a dive. They use their high speeds to hunt other birds. Like the bald eagle, DDT in the environment affected the peregrine's ability to produce viable eggs. By 1964, the peregrine was eliminated from the eastern United States and drastically reduced elsewhere. The peregrine is listed as a federal and state endangered species.

Fortunately, biologists at Cornell University discovered that the peregrines could be ''hacked'' into their former range. ''Hacking'' involves placing four to five week old peregrines into a large box on top of a city building or a cliff. The young birds stay in the box for five to ten days until their flight feathers are nearly developed. The box is opened and the birds are free to stretch their wings and learn how to fly. The young falcons cannot capture their own food for about a month after release, so food is provided at the hack box. After the falcons can capture their own food, they tend to join the fall migration and head south. The goal is to have falcons return to the hack site two or three years later to nest.

Minnesota began releasing peregrines in 1982. Some of their city birds have returned to the same city to nest. Others have found mates in other cities throughout the Midwest. Michi-

Falcon Forecast continued on page 3

Falcon Forecast

This summer the Nongame Program will

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Falcon Forecast continued from page 2

gan, Wisconsin, Illinois, Missouri and Nebraska also have peregrine recovery projects. By joining the Eastern Peregrine Recovery Program, we hope to have some of our falcons return and nest at our hack sites and have other falcons ''discover the heartland'' and settle in Iowa. We'll also be contributing birds that may nest elsewhere, but will ultimately help the regional goal of establishing 25 peregrine nests in the Midwest.

Our first release will take place this July in downtown Cedar Rapids. The canyons, sheer walls and ledges of the Cedar Rapids buildings will provide artifical cliffs for the five young falcons. Releasing peregrines in a city takes much coordination. Telecom*USA has graciously offered it's roof as the hack site where the hack box and young falcons will be located. To observe the peregrines once they are flying, Stouffer Five Seasons Hotel has given us permission to use its roof as an observation area. The Stouffer's building is taller than the Telecom*USA building, so the hack-site attendants will be able to look down on the birds from the Stouffer building and view the falcons at nearly every other location in town. On the one side where the attendant's view would be inhibited by another building, Merchants National Bank has offered its roof as a secondary observation area. Merchants National Bank also plans to acquire a remote camera and television monitor for the project.

The camera would be used to observe the birds while they are being held in the box. The monitor would be set up at an educational display in the bank's lobby. This would allow people to visit the display and actually view the young peregrines as they develop. To help people learn more about peregrines and to view them while they are in the city, the Nongame Program and Linn County Conservation Board will coordinate volunteers to run an observation area. If the peregrines start hanging out on certain roofs, spotting scopes will be set up so that people can observe the young falcons.

In case of an emergency (a falcon lands in the street, is stuck on a ledge, or enters a vent) people can call the hack site attendants at Stouffer Five Seasons Hotel (319/363-8161). The attendants will come and rescue the bird. If the falcon needs first aid, Macbride Raptor Center's extension out of Kirkwood Community College has offered its services.

Many other groups are beginning to contribute to the peregrine program. Palisades Kepler State Park is donating a cabin to house the hack site attendants. The Iowa Falconers Association has assisted the Nongame Program with peregrine surveys. The falconers also hope to donate a radio transmitter to help track the movements of the falcons in the city. They also plan on selling a peregrine art print by artist Lysle Anderson. Kevin Johnson who has sold a stained glass window featuring a peregrine falcon is donating 10 percent of his proceeds. Likewise woodcarver Barb Nelson is contributing a portion of all raptor carvings she sells.

The Iowa Wildlife Federation has already donated $2,000 to the peregrine project. They have also designed a beautiful, 100 percent cotton, peregrine falcon T-shirt and sweatshirt. Money raised from the shirt sales will go to the peregrine project. To order a shirt use the form provided on page 5.

As the details progress, we should have more information on the educational display, when exactly the birds are arriving and other ways people can help the project. Once the young peregrines arrive in July, they will be monitored by the hack site attendants from sunrise to sunset. The hack site attendants will be charting the falcons' health, flight development, whether they are returning to the box to feed, their movements and when they start feeding themselves. The attendants will also be watching for any problems the young birds may encounter.

We'd like to thank the city of Cedar Rapids, Telecom*USA, Stouffer Five Seasons Hotel,

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Falcon Forecast continued from page 3

Merchant's National Bank, conservation groups, individuals and other agencies that are contributing to this project. To restore the peregrine in Iowa, will take the cooperative effort of many Iowans. So far things are progressing nicely and if the enthusiasm continues, the forecast for the future of peregine falcons in Iowa will be very good. Watch for their arrival!

? Questions About Peregrines ?

As the arrival date for the peregrine falcons nears, the Nongame Program has given an increasing number of talks about the peregrine project and has answered a variety of questions from the public and media. Most of the response to the project has been positive. However, like any new project, there have also been concerns and some confusion. To help people more fully understand the peregrine project, below are the answers to the most frequently asked questions about the project.

1. Why is the Nongame Program Reintroducing Peregrines?

We're reintroducing the peregrine falcon because it is a federal and state endangered species which formerly nested in Iowa. Peregrines were virtually eliminated from the eastern United States by 1964. Originally, there were over 300 peregrine nests from the Mississippi River east. Most of the nesting in Iowa occurred along the Mississippi River. During the past couple decades, much research has gone into how to restore peregrines to their former range. These techniques have been successfully used in Michigan, Illinois, Wisconsin, Minnesota, Missouri and Nebraska. By joining the peregrine recovery effort, Iowa will be helping the peregrine to return to Iowa and will be assisting the overall regional effort to restore a viable population of these birds to the Midwest.

2. Why are you releasing the falcons in Cedar Rapids?

Cedar Rapids is within the northeast quarter of the state that we are targeting for releasing falcons. It is also near a historic nest site that occurred on the cliffs bordering the Cedar River. Cedar Rapids also has a downtown section with some tall and some medium height buildings. The layered effect of the buildings provides the young falcons with a choice of perching sites which will help them to avoid landing in the street. The tall buildings also funnel the wind upward which provides an updraft for the young birds to use when they are learning how to fly.

3. Are the falcons being released to control the city's pigeon and crow population?

No. Again, we're releasing the birds to help an endangered species. Mathematically the falcons simply can't control the pigeon and crow populations. The peregrines only eat about two blackbird-sized birds per day. We're only releasing five birds this year in Cedar Rapids and for the first four weeks after they are released, they still cannot catch their own food. Even after they can feed themselves, the five birds will eat comparatively little, so they will have no impact on the pigeon population. Additionally, sometime during the fall the young falcons will migrate out of Cedar Rapids. Consequently they won't even be in town when the main crow problems occur.

4. Will the peregrines harm the local songbird or kestrel populations?

Again, there simply won't be enough falcons to have any negative affect on the local bird populations. The peregrines released in other cities have generally fed on pigeons, starlings, blue jays, grackles, mourning doves, nighthawks, swallows, swifts and cuckoos. They may occasionally kill a songbird and they may kill a kestrel. However, the five falcons that are released will have less impact on local bird populations than pet or feral cats, raccoons, or other predators already occurring in the city. Even once the falcons are established in Iowa they will not harm the bird populations. As a predator, peregrines take longer to become sexually mature and they produce fewer young than most of the species they prey on. Consequently there are less

Questions continued on page 5

Questions continued from page 4

predators than prey. If prey populations ever would drastically decline, the peregrines would have no food, so their population would also drop.

5. Where do the pergrines come from?

Various breeders throughout the Midwest produce the young falcons in captivity. The Raptor Center in Minnesota coordinates the distribution of these captively-produced falcons to the various states that have a peregrine reintroduction program. Because of the coordination efforts of Drs. Redig and Tordoff of Minnesota, peregrine price wars are being avoided and genetic diversity is being maintained.

6. Will the peregrines nest at Cedar Rapids?

First the peregrines have to survive. Young peregrines, like most wild animals have a very high mortality rate their first year. Between 60 to 70 percent of the young falcons die during their first year because of accidents, predation and lack of hunting skills. After their first year 80 percent of the falcons survive and can live to be 12 or more years old. Most falcons aren't sexually mature until they are three years old. Thus it will be two or three years before we find out if the birds will return. Although the falcons are being imprinted on Cedar Rapids, if they survive to maturity, they may choose a different area to nest in. At other release sites, some birds have returned to nest and others have found mates and nested elsewhere. We hope they nest here, but if they nest elsewhere in the Midwest, they are still helping the overall recovery of the species in this region.

7. Who is paying for this project?

Currently the Nongame Program is funding over 90 percent of the project. Originally the Nongame Program was hoping to receive some federal money to support the project, but none of that money is available. Therefore, the Nongame Program now hopes that individuals, conservation clubs and corporations will help support the project. In other states 20 to 100 percent of the project costs have been raised from outside means. Each falcon costs about $2,000. Project costs also include developing the peregrine plan, purchasing food for the falcons, building the hack box, and hiring biologists to monitor the birds plus developing educational material to inform people about the project. The project will cost about $23,000 this year. Contributions are beginning to come in. As the project develops we hope more people will help support the project. The public can remember to give to the Nongame Program via the Fish and Wildlife Checkoff on the income tax form or send a direct contribution to the Nongame Program. Clubs or corporations interested in raising funds for the peregrine project or those wishing to make direct contributions should contact nongame urban biologist, Laura Jackson. Thank you.

THE 1989 IOWA WILDLIFE FEDERATION – PEREGRINE FALCON SHIRT ORDER BLANK

NAME _____ ADDRESS _____

CITY _____ STATE _____ ZIP _____

Sweatshirts and T-shirts can be ordered in sizes small, medium, large, and x-large. For xx-large orders add $2.00. Colors are white for sweatshirts and white or tan for T-shirts.

	Quantity	Size	Color	Price	Amount
Sweatshirt	_____	_____	White	$12.00 @	_____
T-shirt	_____	_____	White	8.00 @	_____
T-shirt	_____	_____	Tan	8.00 @	_____
				Total	_____
				Tax	_____
				Shipping/handling	$2.00
				Amount enclosed	_____

PLEASE SEND YOUR ORDER AND CHECK OR MONEY ORDER TO THE FOLLOWING ADDRESS:

IOWA WILDLIFE FEDERATION, INC.

Peregrine Falcon Program 1989
P.O. Box 1222
Cedar Rapids, Iowa 52406

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Cathy Meddin photo

Nongame biologist, Laura Jackson, introduces a young peregrine falcon to an eager group of photographers--what an exciting press conference!

Peregrine News

On July 26th, four young peregrine falcons arrived in Cedar Rapids Iowa. The birds ranged from 36 to 39 days old and were dotted with patches of down. Over 50 people from sponsoring businesses, clubs and the media were present at Telecom*USA when the peregrines arrived.

People were given an opportunity to view the falcons when the travel kennel that they arrived in was opened. Only one bird needed to be banded and color-marked with a dot of green paint on its wing. During the process the people were amazed by the falcons, and the falcons were probably amazed by all the people. The four birds were then placed in a caged box on top of Telecom*USA.

By July 28th, the oldest bird had shed most of its down and had begun doing a lot of flapping and charging at the bars. The behavior called

PEREGRINE NEWS continued on page 5

PEREGRINE NEWS continued from page 4

''preflight restlessness,'' indicated that the falcon was ready to fly. Consequently on July 30, the bars were removed and the falcons were free to fly. To me, freeing the falcons was exciting--and nerve wracking. It's akin to letting your 16 year old child loose with your new car before they've ever taken a driver's education class. You hope for the best and fear for the worst.

Since they had just lost their down and had been raised in captivity, none of the birds had ever flown before. Additionally, no adults or older falcons would be around to give them a few pointers on flying. Everything these birds did would be a combination of instinct, trial and error. About 20 minutes after the bars had been removed, the first falcon ventured out onto the perch outside of the box. Eventually he was joined by a second bird. That stimulated a round of flapping as the first bird jumped (fell) off the perch and onto the rooftop. He then continued to vigorously flap, started running, then lifted off. "RGO" was the first young falcon to fly in Iowa in over 30 years.

About as soon as RGO got past the security of the roof, he made a circle to come back to the Telecom*USA building. Unfortunately he had lost elevation and ended up trying to hold onto the sheer wall about three stories short of his goal. He could only cling there for a second, so he dropped, regained control and flapped to the steeple of a nearby church. There, the "majestic predator" was attacked by an irate pair of robins and a kingbird. The rest of the siblings opted to hang out on the roof that day.

Our goal while monitoring the peregrines is to document when each falcon feeds, when and their flight development. With just these few details we know whether or not to be concerned if a bird is missing for a day or two and when they are capable of surviving on their own. For the first four weeks after they are released, the young birds simply cannot fly well enough to capture their own food. Consequently they return each day or so to feed on food that we put out on the Telecom*USA roof.

Their flight progresses at a fairly predictable pace. First the falcons just flap in place. Next they can make some short flights but have to flap continuously. At the next stage, they begin to coast a little, then discover that they can ride the thermals upward. Now they are ready to engage in "games" of mock combat with each other that includes chases, short dives at each other and some rolls where the bottom bird rolls on its back and reaches its talons upward to the bird above. Then the revelation occurs. They notice there are other objects flying and perched. Their first quarry is insects. Then they start chasing other birds. Eventually they become skillful enough to capture another bird and finally, six weeks after their first flight, they become self-sufficient.

Within a day or so all of the falcons began their flight development. The female clearly demonstrated to us and the media, all the biological facts about female raptors. Female raptors are about a third larger than the males. Consequently, they eat more and are slower to develop. Our female (LG) was true to form and was the last falcon to fly. She also flew less than the males and ate more. One night she attracted the limelight when after a huge meal, she accidentally fluttered onto the ground at 9 p.m. and was too full to fly back. She got an elevator ride up.

The surprise of the summer was the expansion of the peregrine project. Originally we were scheduled to only release 5 birds this summer. By chance, some captive peregrines had a late flurry of reproductive activity. This meant some extra falcons would be available. Because we already had the site, peregrine attendants, food and a cooperative spirit, we requested the additional birds. This move put the Nongame Program ahead of schedule as far as recovery goals and increased the cost-efficiency of the project.

Two weeks after the older falcons were out of the box, five younger falcons were moved in,

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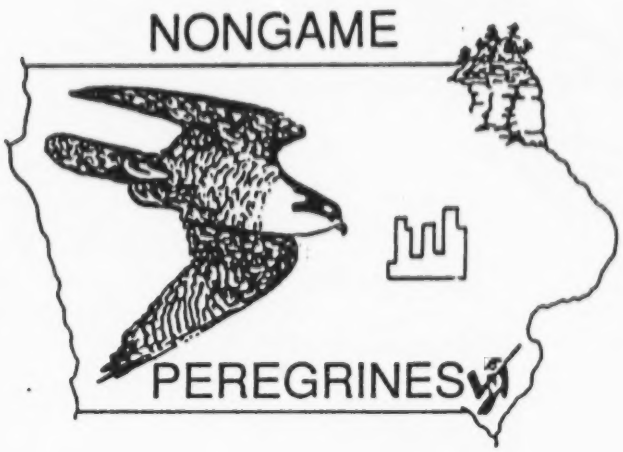
PEREGRINE NEWS continued from page 5

bringing our total to 9. The second group was released August 19. Because the older falcons were still around, the younger birds had some role-models for learning how to fly. By mid-September the older falcons will probably migrate out of the area. The younger group of falcons will probably leave by the end of Septembe

So far all is well with the peregrine project. The falcons have been healthy and progressing on schedule. We hope all of our birds will be fledged safely from Cedar Rapids, but realistically we know young birds are prone to accidents and mortality. Once the falcons survive their first year they have an 80 percent survival rate. Ultimately, when these birds become sexually mature in a year or two, we hope Cedar Rapids will host the first peregrine nest in Iowa since 1956.



Peregrine Thanks

It's not often that you can get over a dozen agencies, businesses and clubs to work together for a common cause. Incredibly, the peregrine falcon project has brought together numerous people and has generated far more cooperation than we ever imagined. In essence, the hospitality has been humbling.

The challenges of a hundred details that make a project successful, were met with enthusiasm, by nearly 100 different people. We've had support and assistance from the clerical, engineering, facility, security, maintenance, public relations and administrative staff of seven businesses. We've had volunteers and donations by several conservation clubs and individuals. The media has done a sensational job of informing people about the project and addressing concerns that people have about falcons. The hack site attendants have worked until their eyes were bloodshot from looking through spotting scopes and voices were hoarse from answering questions.

It has been a tremendous effort by everybody. Within this list is a personal thank you to each individual. We hope you understand how truly grateful we are to each of you.

Iowa Department of Natural Resources: administrative support, information and education expertise

Iowa's Nongame Program: Funding, personnel

The Raptor Center, University of Minnesota: regional coordination, falcon arrangements, technical advice

Telecom*USA: hack site

Stouffers Five Seasons Hotel: observation area

Merchants National Bank: educational display, television monitor, observation area

D.B. Acoustics: camera system for display

Cellular One: portable phones for hotlines

City of Cedar Rapids: parking permits

Cedar Rapids Police: aid to falcons on streets

Macbride Raptor Center, Kirkwood College & University of Iowa: first aid facilities, food storage

Linn County Conservation Board: public viewing

Coe College: owl survey

Palisades Kepler State Park: attendant housing

PERGRINE THANKS continued on page 7

PEREGRINE THANKS continued from page 6

Cedar Rapids Audubon Society: volunteers for educational display, donation

Iowa Wildlife Federation: t-shirts, donation, trust fund management

Iowa Wildlife Rehabilitators Association: t-shirts, donation

Iowa Falconer's Association: volunteers, donation

Cedar Rapids Gazette: falcon updates

Television Channels 9,2,7 and other media across the state: falcon updates

Artist Kevin Johnson: donation

Artist Barbara Nelson: donation

A special thanks to Bruce Ehresman, Pat Schlarbaum, Dave Conrads and John Heusinkveld for hours of falcon watching and falcon work.

Cathy Meddin photo

Falcon Fever -- Catch It!

This year's nongame poster features the peregrine falcon. The full-color poster includes a photograph of an adult falcon taken by Don Poggensee and a photo by DeWaine Jackson of the young falcons, taken when they arrived in Cedar Rapids. The poster also includes a description of the peregrine falcon project and highlights the 1989 activities of the Nongame Program.

This is the second time Don has donated his beautiful wildlife photography for the nongame poster. His bald eagle photo, which was used in 1987, was so popular extra posters had to be printed and several other states requested the photograph for promoting their nongame programs. Don lives in Ida Grove where he works as an industrial photographer and runs Wind Rider Images Studio. Besides photographing Iowa's wildlife, Don also teaches photography and leads photographic tours. Don has been active in a variety of nongame activities and was awarded the Governor's volunteer award in 1988 for his efforts for nongame wildlife.

DeWaine has been a forest game wildlife research biologist for the DNR since 1984. He has enjoyed wildlife photography as a hobby for the last 10 years. DeWaine has studied a wide range of wildlife species -- from bobcats in Colorado to waterfowl and white-tailed deer. He is currently involved in Iowa's deer, turkey and grouse research programs.

Nongame posters will be sent to tax preparers who request a supply. Clients who contribute to the Nongame Program via the Fish and Wildlife Protection Fund checkoff can receive their poster from participating tax preparers.

Posters can also be obtained by sending a minimum donation of $5 to:

Nongame Program
Iowa Department of Natural Resources
Wildlife Research Station
RR 1, Ledges Road
Boone, IA 50036

The poster is our way of thanking you for your support.

Falcon Wrap Up

August 29 was a memorable day (good and bad) for the peregrine falcon project. The night before, our youngest female had crashed into a building. Observers called us immediately and the falcon was retrieved. She exhibited no signs of injury, but she was still held overnight at the University of Iowa's Macbride Raptor Center extension at Kirkwood Community College. That morning, while the veterinarian was examining her, the young female died of a concussion.

Four hours later, Nongame Program personnelwere at the Cedar Rapids airport awaiting the arrival of another falcon via Northwest Airlines. This falcon was originally released in Columbus, Ohio, July 18. After a flight on July 19, the young male disappeared. Five days later he was found inside the 41st floor of the building, trapped under a plastic pan. The falcon was badly dehydrated and required surgery because he had repeatedly hit the pan with his back during attempts to escape. While the male was in rehabilitation, his hack box mates were honing their flying skills to perfection. Four weeks later, when he was ready to go, he was sent to join the younger birds who had only been flying for 10 days.

Both our younger and older falcons readily accepted the Ohio bird when he was released August 30. Within three days, the Ohio bird was flying well enough to join the other falcons in aerial mock combat.

In September we observed signs that the falcons were beginning to capture their own food. Less food was eaten at the Telecom*USA building and bird bodies (probable falcon kills) were observed at the falcons' favorite perching sites. By September 12, the first falcon left. By September 26, six falcons were gone and the remaining three spent the majority of their time away from the

Telecom*USA building. September 29 we closed down the observation area at Stouffer Five Seasons Hotel.

Students from Kirkwood Community College's parks and recreation program, volunteered to continue to set food out on the Telecom*USA roof for any falcon which needed a snack. By late October, only one falcon was still in town. This bird was still around in mid-November.

Physically, the falcons could survive the winter in Iowa, but most usually migrate. The supply of pigeons and sparrows remains stable throughout the winter, so if this falcon remains, it should have plenty to eat. Most falcons do not attempt to nest until they are two or three years old --so we do not expect the falcon to stay and nest. If no falcons attempt to nest in Cedar Rapids next year, we will release ten more birds at the same site. Because falcons are territorial, if a pair did attempt to nest, we would have to move our release site to another city. Stay tuned!

Thank you again to all of the cooperating businesses, agencies, clubs and individuals involved in this exciting project.

IWRA Peregrine T-Shirt Order Form

Your Name_____

Address_____

City_____State_____Zip_____

T-Shirts: $8.00 plus $2.00 postage per shirt
Tri-color graphic design available on ecru or cool green shirt color.

MAKE CHECKS PAYABLE TO:

"IA WILDLIFE REHAB ASSN." -PEREGRINE FUND

ORDER FROM: IWRA PEREGRINE FUND
C/O KATHY CUDDEBACK
MORNING STAR FARM
RR 1
BRIGHTON, IA 52540

PROFITS SHARED WITH IOWA DNR
PEREGRINE FALCON REINTRODUCTION PROJECT

NEW Sweatshirts - light aqua green. Adult sizes only. Cost: $15 plus $2 postage per shirt.

Number Ordered

	Youth		Adult			
	M	L	S	M	L	XL
Green						
Ecru						
SWEATSHIRT	X	X				

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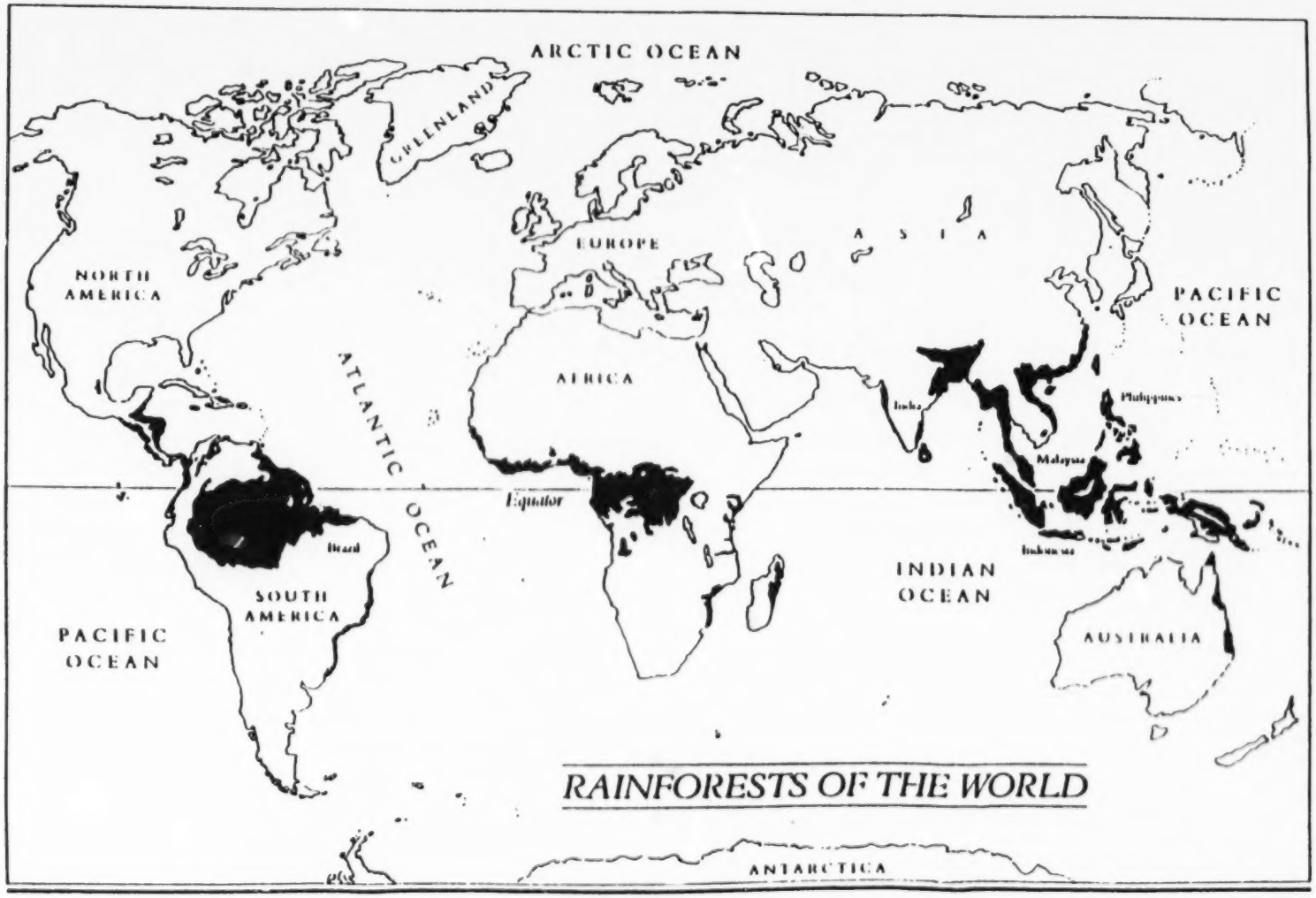
ARCTIC OCEAN
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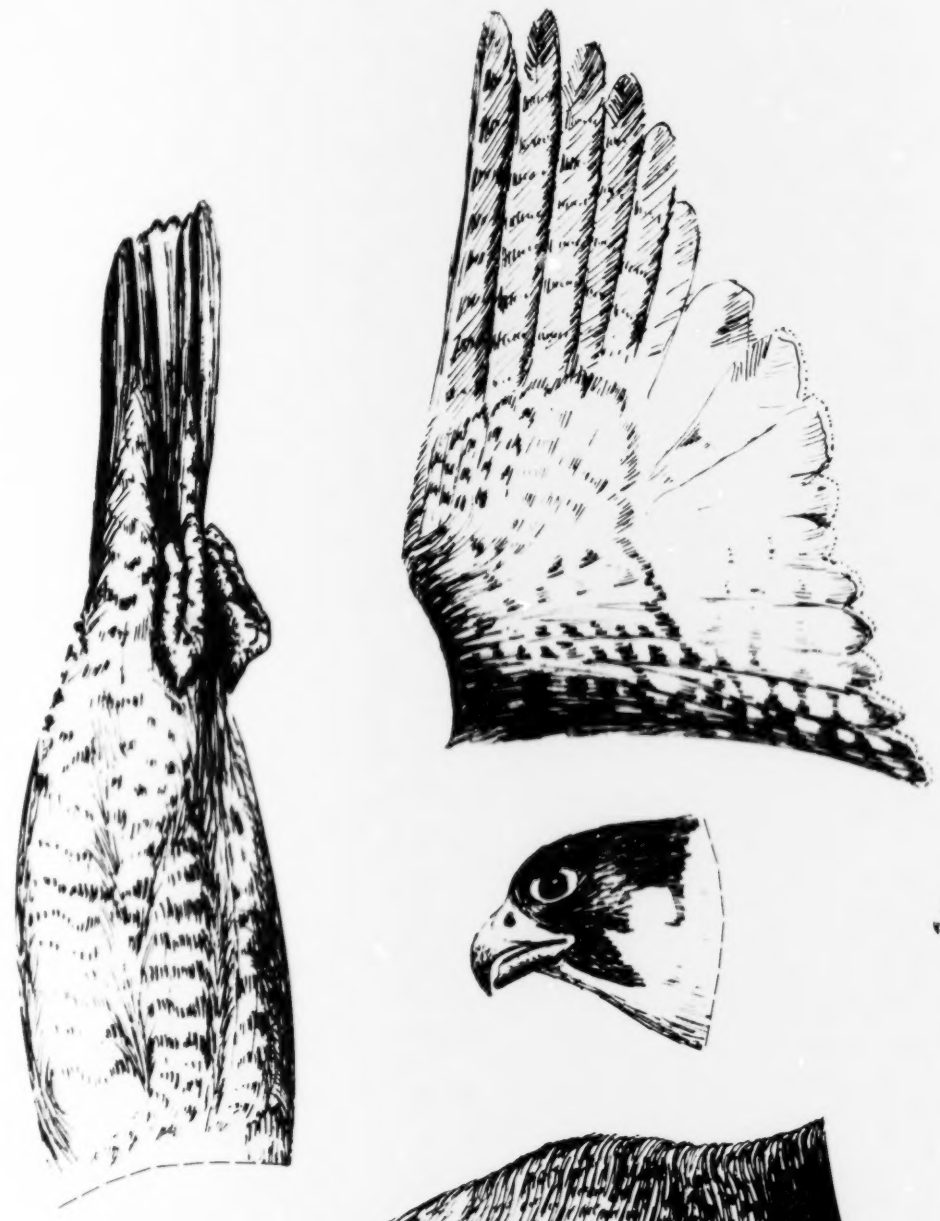
RAINFORESTS OF THE WORLD
ANTARCTICA

Fascinating Falcons: SUITED FOR SURVIVAL

PEREGRINE PARTS



Finished Peregrine

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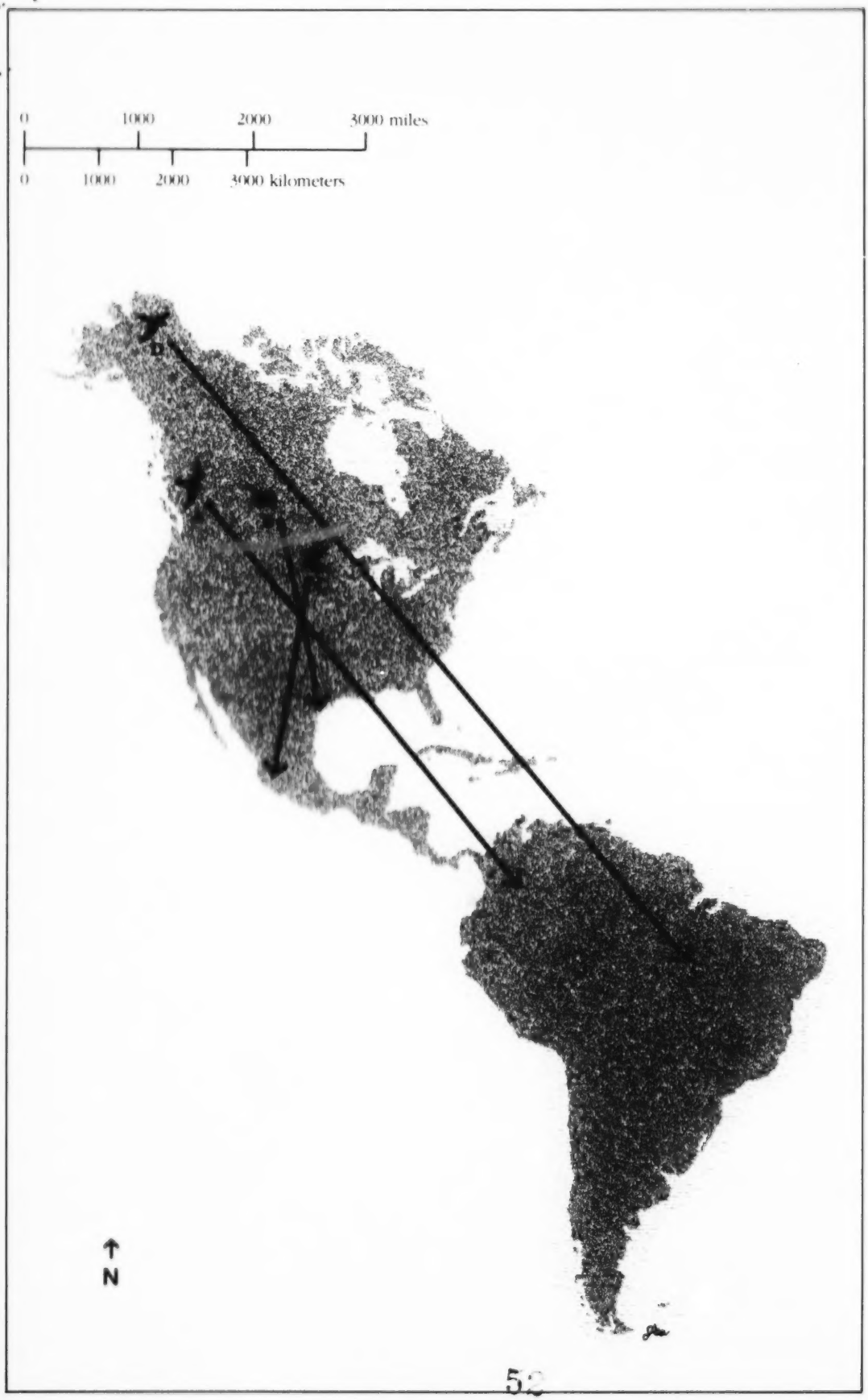
Fascinating Falcons: PURSUING PEREGRINE PATHS

PEREGRINE PATHS WESTERN HEMISPHERE



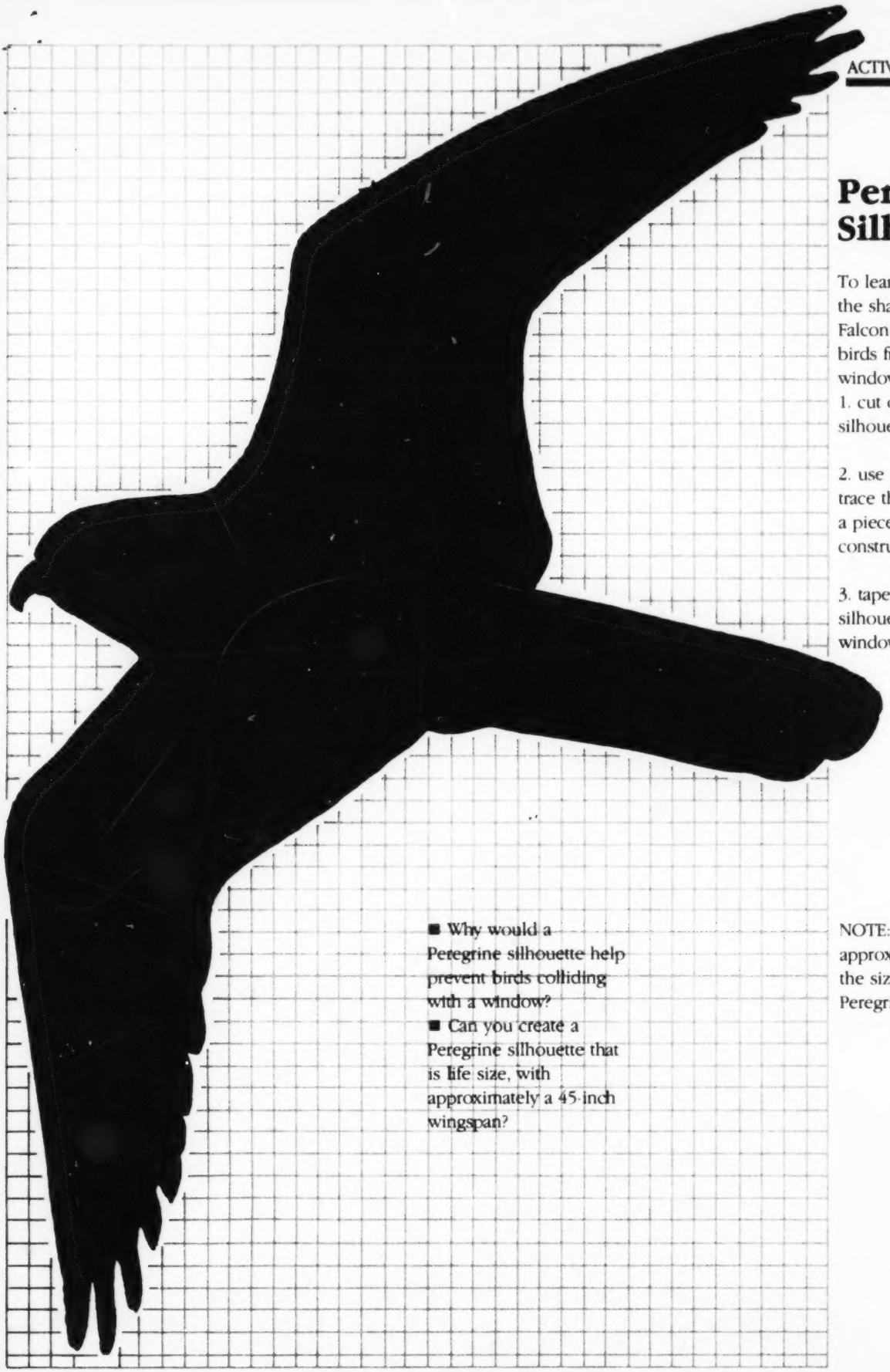
Peregrine Silhouette

To learn how to identify the shape of a Peregrine Falcon and to prevent birds from colliding with windows:

1. cut out the Peregrine silhouette

2. use the template to trace the Peregrine on to a piece of black construction paper,

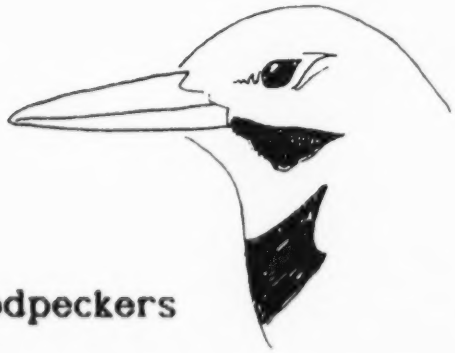
3. tape or glue the silhouette to the window.



- Why would a Peregrine silhouette help prevent birds colliding with a window?
- Can you create a Peregrine silhouette that is life size, with approximately a 45-inch wingspan?

NOTE: This silhouette is approximately one fourth the size of an adult Peregrine Falcon.

BEAK AND FEET COPY PAGE: THE BIRDS ON THIS COPY PAGE ARE LOCATED RIGHT NEXT TO THEIR FOOT TYPE. NOT ONLY CAN THIS PAGE BE COPIED AND CUT FOR GAME CARDS BUT IT CAN ALSO BE USED FOR VERIFYING THE STUDENTS' MATCHES.



Woodpeckers

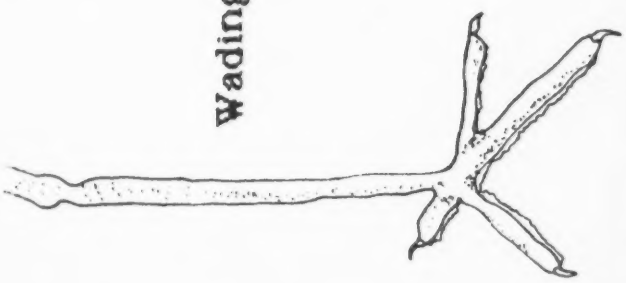
Climbing

Falcons,
owls, hawks,
eagles

Preying/Grasping

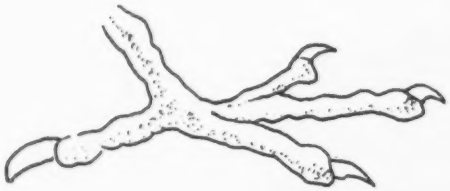
Great Blue Heron

Wading

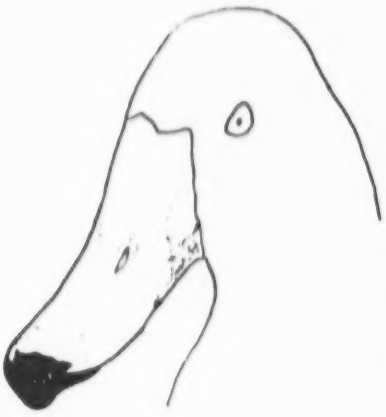


Robin

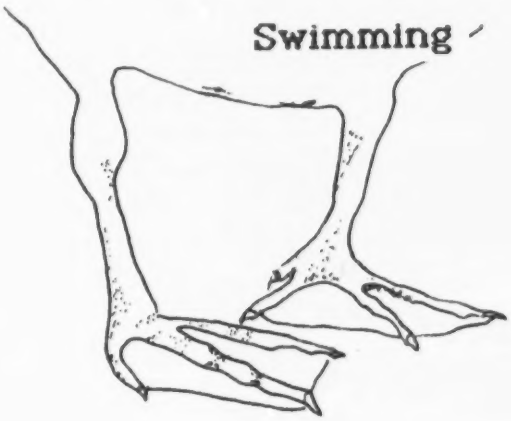
Perching

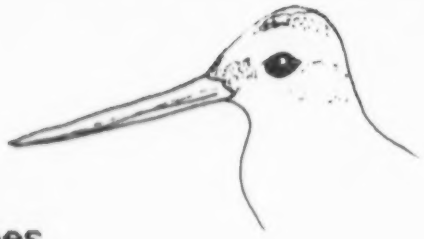


Ducks

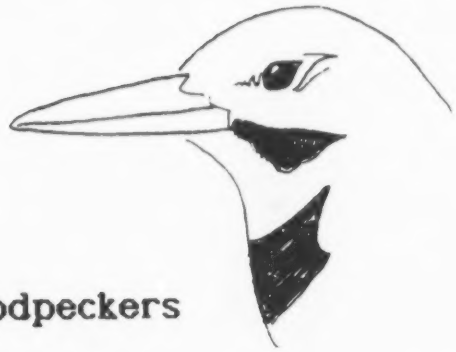


Swimming

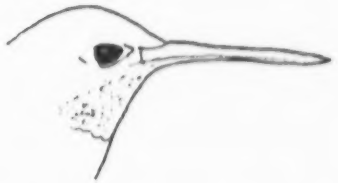




Snipes,
godwits
and
kiwis.

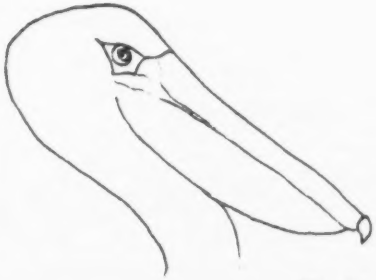


Woodpeckers



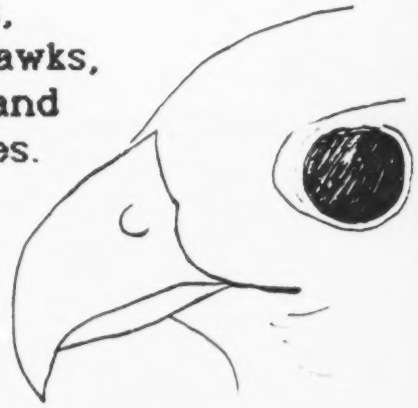
Hummingbirds

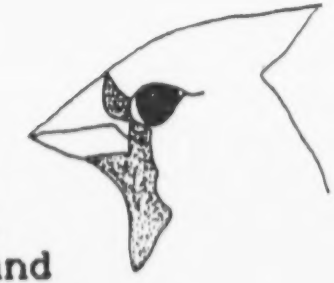
BEAK AND TOOL
COPY PAGE



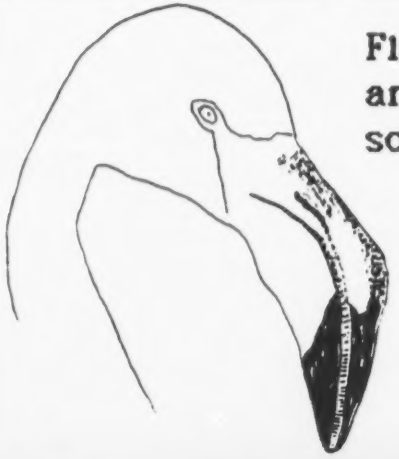
Pelicans and
Spoonbills.

Falcons,
owls, hawks,
eagles and
vultures.

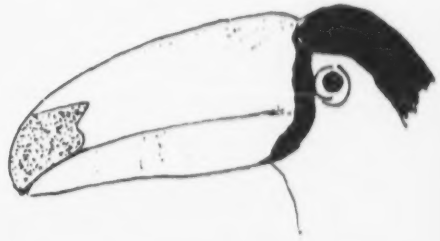




Cardinals,
grosbeaks,
sparrows and
other finch-like
birds.

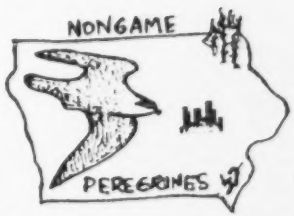


Flamingos
and
some ducks.



Toucans

Recovering Our Heritage



Peregrine Falcons

Certificate of Achievement

In recognition of your quest for knowledge of birds and their natural habitats, the Iowa Department of Natural Resources hereby awards you this Certificate of Achievement. Only through an understanding of nature, can we know how to safe guard a healthy environment. May your quest for discovery continue always!

DNR

_____ _____

Your Name Date

_____

Location

50

ACKNOWLEDGMENTS

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IOWA DEPARTMENT OF NATURAL RESOURCES
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DES MOINES, IOWA 50319-0035

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